REPORT

OF THE

CANADIAN ARCTIC EXPEDITION
1913-18

VOLUME III: INSECTS

PART C: DIPTERA

Crane-flies	C. P. Alexander
Mosquitoes	H. G. Dyar
Diptera (excluding the Tipulidæ and Culicidæ)	J. R. Malloch

SOUTHERN PARTY—1913-16

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J. de LABROQUERIE TACHÉ
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
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Issued July 14th, 1919.

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The Crane-flies collected by the Canadian Arctic Expedition, 1913-18.

By CHARLES P. ALEXANDER, Ph. D.

INTRODUCTION.

The collection of crane-flies made by the Canadian Arctic Expedition is quite extensive, and includes about 100 specimens of adults, larvæ, and pupæ. The types and uniques have been placed in the Canadian National Collection; certain of the paratypes and duplicates are retained in the collection of the author. The present report has been divided into two general portions, the first on the taxonomy of the adult flies, the second a consideration of the immature stages and the biological data secured by the collector, Mr. Frits Johansen.

The material represents as satisfactory a collection of Arctic American Tipulidæ as has yet been brought together. The itinerary and general narrative of the Southern Division of the Expedition has been recorded by Dr. R. M. Anderson (1917).[1]

BIBLIOGRAPHY.

There have been rather numerous species of crane-flies described from the Canadian Arctic Northwest, the more important reports on these collections being as follows:—

Kirby, Wm., (1824) in the supplement to Capt. Parry's first voyage described *Stygeropis parrii* (Kirby).

Curtis, John (1831) in the appendix to Ross's voyage to the Arctic regions, described *Tipula arctica* Curtis.

Loew, Hermann (1863–1865) in the Centuries of North American Diptera described the numerous species of Tipulinæ collected by Robert Kennicott, now in the Museum of Comparative Zoology at Cambridge. These specimens bear the general label of "H.B.T," only a few of them having any more exact label. In another paper (Proceedings of the Academy of Natural Sciences of Philadelphia, September, 1915, pp. 458–465) I have discussed Loew's species and their present condition.

Osten-Sacken (1859–1869) described most of the Limnobiinæ collected by Kennicott and also (1876) *Tipula besselsi*, from Polaris bay, Greenland, at about 82 degrees north latitude, collected by Dr. E. Bessels in 1872.

Bergroth (1888) described several new species mostly from Sitka, Alaska. Most of these were rediscovered on the Harriman expedition (see Coquillett).

ston (1893) described *Stygeropis bergrothi* from Alaska. The type was recorded as having been placed in the Kansas University collection, but is not mentioned among the types in Hunter's list (Kansas University Science Bulletin, vol. 8, No. 1. p. 18; 1914) nor have I been able to locate the specimen.

Doane (1900, 1901) described a very few species from Unalaska, his types being in the collection of the United States National Museum.

Coquillett (1900), The Crane-flies of the Harriman Expedition to Alaska, the types are now in the collection of the United States National Museum.

Dietz (1915), two Limnobiine crane-flies collected by Francis Harper in the Athabaska country.

Alexander (1915–date), species collected by Kennicott in the Loew collection but never described by Loew; the types are now in the collection of the Museum of Comparative Zoology. The crane-flies of the Pribilof islands, now in the collection of the United States Biological Survey.

The most important collections from the Arctic Northwest may be considered to be the following: Kennicott's collections, the Harriman Expedition, the Pribilof islands collections, and the present one.

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[1] Report of the Department of the Naval Service for the Fiscal Year ending March 31st, 1917. Ottawa: A 1-2, pp. 22-70. Also Summary Report of the Geological Survey, Dept. of Mines, for the calendar year 1913. *Ibid.* 1914, 1915, 1916.

From the above material a good idea of the general facies of the crane-fly fauna of the Canadian Arctic Northwest may be obtained. The species are almost, if not all, forms of dull, sombre colouration—browns or greys—and most of them are of simple, primitive organization. A considerable number show unmistakable signs of degeneracy in the wings, this condition being particularly noticeable in the Pribilof islands, where fully half of the known species have the wings more or less atrophied. In the present collection, two of the Limnobiine forms showed the first stages of wing-atrophy, but all of the ten Tipuline species are full-winged. Some of the species of Arctic Tipulidæ have the head, the thoracic intervals, the pleura, coxæ, etc., clothed with an abundant long, erect pubescence. Many of the Arctic crane-flies seem to be very local in their distribution. Thus the collections from the Pribilof islands show not one of the species taken elsewhere in the Canadian northwest (with the possible exception of *Trichocera*). Similarly, the collections of the Harriman expedition and the present collections show that the species are in large part very local in their distribution, the natural barriers of mountains and large water-bodies having proved a very efficient check upon their dispersal. In the present collection there are a total of sixteen species, only two or three of which have been found elsewhere; of these *Tipula arctica* and *Stygeropis parrii* are rather well-known Arctic American species, and the *Trichocera* is probably Holarctic in its distribution.

The collection that is reported upon in this paper is constituted as follows:—

Rhyphidæ—		
Trichocerinæ—		
Trichocera		1 species.
Tipulidæ—		
Limnobiinæ—		
Limnobiini.	*Dicranomyia*	1 species.
Eriopterini.	*Erioptera*	1 "
Limnophilini.	*Limnophila*	1 "
Pediciini.	*Tricyphona*	2 "
Tipulinæ—		
Tipulini.	*Stygeropis*	2 "
	Nephrotoma	1 "
	Tipula	7 "

The general tendencies of distribution of crane-flies in the high Arctic regions are well shown by the above list, the omnipresent *Trichocera*, a dominance of Pediciine and Tipuline genera, with a smattering of *Limnobiini*, *Eriopterini* and *Limnophilini*. The extensive tribes *Antochini* and *Hexatomini* (in the strict sense)[1] seem to be entirely lacking so far as known. The *Ptychopteridae* are likewise lacking and the single record for the *Tanyderidæ* (*Protoplasa*) is unsatisfactory.

ADULT FLIES.

Family **TIPULIDÆ.**

Subfamily **LIMNOBIINÆ.**

Tribe *LIMNOBIINI.*

Genus **Dicranomyia** Stephens.

Dicranomyia Stephens; Catalogue of British insects, vol. 2, p. 243; 1829.

Dicranomyia alascaensis, n. sp.

Antennæ black; halteres short; wings nearly hyaline, with a large, oval, brown stigma; Sc_2 remote from the tip of Sc_1; cell *first* M_2 closed; femora yellow, tipped with brown.

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[1] Concerning the status of the tribe *Hexatomini*, read the remarks under the genus *Poecilostola*, page 000.

Female.—Length, 5·5 mm.; wing, 6·8 mm.

Rostrum and palpi black. Antennæ black, the basal flagellar segments enlarged, beyond the fifth oval, the last segment elongate. Head dark-coloured, discoloured in the type.

Thorax dark-coloured, discoloured in the type, probably grey pruinose; pleura grey pruinose. Halteres short, pale at the base, the remainder brown. Legs with the coxæ and trochanters yellow; femora dull yellow, the tips broadly brown, narrowest on the fore femora, broader on the posterior femora; tibiæ and tarsi very light brown, the terminal segments of the latter darkened. Wings nearly hyaline; stigma large, oval, brown; veins brown; venation (Pl. I, fig. 1) Sc_2 remote from the tip of Sc_1 so that Sc_1 alone is about equal to the basal deflexion of Cu_1; Sc_1 ends just opposite the origin of *Rs* ; *r* at the tip of R_1; *Rs* about twice as long as the basal deflexion of R_{4+5}; cell *first* M_2 closed; basal deflexion of Cu_1 at the fork of *M*.

Abdomen dark brown, pruinose, the pleural integument and the valves of the ovipositor yellowish.

Locality: Holotype, ♀, Nome, Alaska, August 24, 25, 1913 (F. Johansen). No. 78.

In the elongate Sc_1 this species suggests *D. halterata* Osten-Sacken, but this is about the only feature that the two species have in common. In other respects it seems closer to *D. aquita* Dietz[1] from Taltson river, Mackenzie district (not Hocker river as stated in the original description), but it is a much smaller fly and the details of both colour and venation are different.

Tribe *ERIOPTERINI.*

Genus **Erioptera** Meigen.

Subgenus **Erioptera** Meigen.

Erioptera Meigen; Illiger's Magazine, vol. 2, p. 262; 1803.

Erioptera (Erioptera) angustipennis, n. sp.

General colouration dark brown with grey pruinosity; wings very long and narrow.

Male.—Length, 4·4 mm.; wing, 5·4 mm.

Rostrum and palpi black. Antennæ black, the flagellar segments oval. Head dark grey.

Mesonotum brown, more greyish on the sides; pseudosutural foveæ conspicuous, transverse, black. Pleura dull grey. Halteres rather elongate, brown. Legs dark brownish black throughout. Wings very long and narrow showing the first stages of atrophy although the venation is normal; membrane slightly suffused with brown; stigma indistinct; veins dark brown; venation (Pl. I, fig. 2) the veins are all very elongated due to the great narrowing of the wing.

Abdomen dull grey, the segments indistinctly paler caudally and here with fringes of long golden hairs that are more sparse elsewhere on the surface; male hypopygium with the pleural appendages slender, pointed at their tips.

Locality: Holotype, ♂, Bernard harbour, Dolphin and Union strait, Northwest Territories, August 1–7, 1915 (F. Johansen). No. 1045.

Readily distinguished from all other members of the genus by the long, narrow wings. The second anal vein is straight as in the subgenus *Acyphona* to which group the species may perhaps be better referred.

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[1] Canadian Entomologist, vol. 47, pp. 331-332, fig., October, 1915.

Tribe *LIMNOPHILINI*.

Genus **Limnophila** Macquart.

Limnophila Macquart; Histoire Naturelle, Diptera; Suite à Buffon, vol. 1, p. 95; 1834.

Subgenus **Dactylolabis** Osten-Sacken.

Dactylolabis Osten-Sacken; Proceedings of the Academy of Natural Sciences of Philadelphia, p. 240; 1859.

Limnophila (Dactylolabis) rhicnoptiloides, n. sp.

General colouration black, dusted with grey; wings long and narrow, the veins heavily spotted and seamed with brown; *Rs* spurred at its origin.

MALE.—Length, 8-8.8 mm.; wing, 8-9 mm.

Rostrum and palpi dark brownish black. Antennæ black, the first segment elongated. Head narrowed behind, dark coloured with a light grey pruinosity; the whole dorsal surface of the head is beset with short, sharp bristles that are directed forwards.

Thorax dark with heavy, clear, light grey bloom; mesonotal praescutum with four brown stripes, the median pair long and parallel. Halteres with the stem pale, the knobs darker brown. Legs with the large coxæ dusted with grey; trochanters dark; remainder of the legs broken. Wings long and narrow, subhyaline, the veins heavily seamed with greyish brown so that most of the wing-surface appears of this dark colour; venation (Pl. I, fig. 3) the wing of the paratype is longer and narrower than that of the type figured; in both wings of this paratype there is a cross-vein in cell R_2 just proximad of the radial cross-vein; *Rs* spurred at its origin.

Abdomen black, sparsely dusted with grey.

Locality: Holotype, ♂, Bernard harbour, Northwest Territories, July 15, 1915 (F. Johansen), No. 1308. Paratopotype, ♂, July 22, 1915, No. 1064.

The wings of this interesting new species are narrower, proportionately, than either *L. montana* Osten-Sacken of eastern North America or *L. damula* Osten-Sacken of western North America and the sector is spurred at its origin. The species shows decided tendencies toward degeneration of the wings and in this respect approaches *L.* (*D.*) *wodzickii* (Nowicky), the type of the proposed group *Rhicnoptila* (Beschreibung neuer Dipteren,—Verhandlungen der kaiserlich-königlichen zoologisch-botanischer Gesellschaft in Wien, vol. 17, pp. 337-354, Pl. 11; 1867). This last species is an even more degenerate *Dactylolabis* occurring in the high mountainous regions (6,000 to 8,000 feet) of the Hungarian Tatras (western Carpathians) where it frequents granitic cliffs in places where the rock surface is constantly moistened by dripping water. Here the degenerate condition is apparently brought about by the great altitude and the habitat. In the present species the degeneracy is the result of living in the high arctics and is quite comparable to the condition in *L. wodzickii*. In my opinion the name *Rhicnoptila* has no status at all, although the descriptions of the immature stages indicate some notable peculiarities. But whether these conditions are real or due to the insufficiency of Nowicky's description has not yet been ascertained.

Tribe *PEDICIINI*.

Genus **Tricyphona** Zetterstedt.

Tricyphona Zetterstedt; Insecta Lapponica, Diptera, p. 851; 1838.

Tricyphona brevifurcata, n. sp.

Thoracic dorsum pale brownish grey with three conspicuous dark brown stripes; wings with vein R_{4+5} as long or longer than its fork.

MALE.—Length, 10 mm.; wing, about 9 mm.

Rostrum and palpi dark brownish black. Antennæ black, the flagellum broken. Head small, dark brown, somewhat paler laterally.

Mesonotal praescutum pale brownish grey with three dark brown, very distinct, stripes, the median one broadest in front, narrowed behind, and ending before the suture, very narrowly bifid behind; lateral stripes shorter and narrower crossing the suture and suffusing the scutal lobes; scutellum and postnotum dark brown. Pleura dark blue-grey pruinose. Halteres light brown, the knobs darker. Legs with the coxæ sparsely pruinose; trochanters dark brown; remainder of the legs very dark brown, only the fore femora a little brighter at the extreme base. Wings subhyaline; stigma rather indistinct, pale brown; a darker brown spot on the *r–m* crossvein and the basal deflexion of vein R_{4+5}; vein *Cu* indistinctly seamed with darker; veins brown; venation (Pl. I, fig. 4) crossvein *r* near the tip of R_1; vein R_{4+5} a little longer than the very short fork.

Abdomen elongate, blackish, with numerous, scattered, appressed golden hairs; basal tergites with a transverse linear impressed area before mid-length of the segments, these interrupted medially; the sternites are narrowly and indistinctly margined caudally with pale.

Locality: Holotype, ♂, west of Konganevik, Camden bay, Alaska, July 4, 1914 (F. Johansen). No. 432.

This is a very distinct species of *Tricyphona*, having the fork of vein R_{4+5} shorter than in any other American species of the genus. The wings of the type are badly broken, but otherwise the specimen is in good condition.

Tricyphona frigida, n. sp.

Belongs to the *diaphana* group; size small, wing under 8·5 mm.; general colouration greyish, the thoracic dorsum with narrow brown stripes.

MALE.—Length, 5·8 mm.; wing, 7·8 mm.

FEMALE.—Length, 7·5 mm.; wing, 7·5 mm.

Rostrum, palpi, and antennæ black. Head grey.

Mesonotal praescutum grey with four brown stripes, the median pair separated by a narrow vitta of the ground colour. Pleura grey. Halteres brown, the knobs a little darker. Legs with the coxæ grey; trochanters brownish grey; femora pale brown, passing into dark brown before midlength of the segment; tibiæ and tarsi dark brown. Wings with a strong brownish tinge, the stigma darker brown; indistinct brownish seams along the sector and the cord; venation (Pl. I, fig. 5) *Rs* strongly arcuated at its origin; *r* close to the tip of R_1; *r-m* about equal to the basal deflexion of R_5.

Abdomen brownish grey; valves of the ovipositor brownish horn-colour. Male hypopygium (Pl. II, fig. 20) with the pleura short and stout, the apical lobe densely beset with acute black spines; pleural appendage yellow, at the tip and on the cephalic face with a few elongated stout bristles; at the base of the pleurites, a sickle-shaped hook ending in a short, subacute tip; below this a smaller curved hook directed caudad. In *T. diaphana* (Pl. II, fig. 21) the condition is quite similar, but the pleurites are even shorter and stouter; the hooklike appendage at the base of the pleurite is scimitar-shaped, at the tip produced into a long drawn out point; the smaller ventral hook is straighter.

It is probable that fresh specimens are not coloured as described above. The type-material is badly discoloured and matted and it is difficult to be sure of the exact condition in fresh or better preserved material.

Locality: Holotype, ♂, Ketchikan, southeastern Alaska, September 10, 1916 (F. Johansen). No. 872. Allotype, ♀, with the type, No. 877.

T. frigida belongs to the group of species that includes *exoloma* (Doane) and *diaphana* (Doane), these three species showing the following group characters:—

Full-winged, the wing or its venation showing no tendencies to atrophy; median cross-vein present, closing cell *first* M_2; cell R_4 very deep so that the *r-m* cross-vein connects with vein R_5 rather than with vein R_{4+5} as in most species of the genus.

It is a much smaller species than either *exoloma* or *diaphana* which have the wings measuring over 10 mm. I am inclined to believe that it is this species that Coquillett records as *diaphana* in the Harriman reports, from the following Alaskan localities:—

Localities: One ♂, Yakutat, Alaska, July 21, 1899; one ♂, Berg bay, June 10, 1899; one ♂, Popof island, July 15, 1899.

It may be that this represents a still undescribed species of the group.

I have the following records for *T. diaphana*:—

Localities: One ♀, Pullman, Wash., May 4, 1898 type; five ♂, ♀, Olympia, Wash., March 16, 1896; one ♂, Seattle, Wash.; one ♂, Vancouver, B.C., March 29, 1902.

Subfamily **TIPULINÆ.**

Tribe *TIPULINI.*

Genus **Stygeropis** Loew.

Stygeropis Loew; Berliner Entomologische Zeitschrift, vol. 7, p. 298; 1863.

A small genus of northern and Arctic Tipuline crane-flies, occurring in both hemispheres. The generally accepted belief that this genus is closely related to *Ctenophora* and its allies is entirely erroneous. This is best proved by a study of the immature stages which are very Tipuline in nature, in some respects uniting the *Longurio* and *Tipula* types.

Stygeropis parrii (Kirby).

Ctenophora parrii Kirby; Supplement to Capt. Parry's First Voyage; 1824.

MALE.—Length, 11–13 mm.; wing, 14–15 mm.

FEMALE.—Length, 17·5 mm.; wing, 15·8 mm.

Palpi short, black. Frontal prolongation of the head short, black. Antennæ (Pl. II, fig. 12) black, the first segment elongate, transversely wrinkled; flagellar segments narrow basally, enlarged distally into a blunt serration on the inner face. Head dull black with a sparse yellowish grey bloom, the sides of the vertex clothed with elongate, pale hairs.

Thoracic dorsum light grey with three broad, darker grey stripes, the median one broadest anteriorly; thoracic interspaces with an abundance of long, erect hairs; an indistinct, narrow, blackish, median stripe runs the length of the notum. Pleura grey, the dorso-pleural membrane more yellowish. Halteres brown, the knobs darker. Legs with the coxæ and trochanters dark, the former grey pruinose; femora reddish brown, the tips broadly blackened; tibiæ and tarsi black. Wings with a slight brownish grey tinge, the costal and subcostal cells more brownish; stigma dark brown; obliterative streak before the cord not very distinct; venation (Pl. I, fig. 7) R_{2+3} long, very slightly arcuated at origin; petiole of cell M_1 present but often greatly shortened as in *parrioides*.

Abdomen dark blue-grey, the segments very narrowly ringed with paler on the caudal margin; lateral margins of the tergites broadly paler. Lobes of the male hypopygium conspicuously yellow; female ovipositor with the tergal valves rather high, narrowly blackened at their tips. Male hypopygium having the ninth tergite (Pl. II, fig. 26) large, the caudal margin with a very deep, U-shaped, median notch, the lateral lobes prominent, obliquely truncated; tergite black, the apices of the lobes broadly pale. Ninth pleurite rather extensive, the pleural suture indistinct beneath; outer pleural appendage (Pl. II, fig. 23) a suboval flattened lobe, dull yellow in colour, slightly broader at the base than at the tip which is obtusely rounded; the outer face of the appendage with sparse, short, scattered hairs; inner pleural appendage (Pl. II, fig. 24) a large, pale brown lobe, flattened, at the tip produced into a long, curved point that is slightly expanded at its tip, the inner face with abundant long, pale hairs. Ninth sternite extensive, a deep split on the mid-ventral line, the margins closely approximated or contiguous.

The following ten specimens are in the collection:

Localities: Nos. 434, 435, 436, and 438, west of Kongenevik, Camden bay, Alaska, July 4, 1914. Nos. 1194, 1195, Collinson point, Alaska, June 22–23, 1914. Nos. 422, 423, 822, and 828, Bernard harbour, Northwest Territories, July 1–14, 1916, and in July-August, 1915.

The most conspicuous differences between this species and the next, *S. parrioides,* are in the dense erect pile of the present species, the clear blue grey colouration, the conspicuous differences in the structure of the antennæ and hypopygium of the male sex, etc.

S. bergrothi Williston[1] is unsatisfactorily described and the type is apparently no longer in existence as was stated earlier in this paper. It is a blackish grey species with the stem of the halteres and the bases of the femora reddish yellow and the wings uniformly tinged with brownish. *S. sordida* Loew (Century 4, No. 42; 1863) has the rostrum black as in the present species and agrees in some other features, but is apparently a different species.

Stygeropis parrioides, n. sp.

Frontal prolongation of the head light brown; antennæ short, the flagellar segments with an inconspicuous transverse ridge before the middle, this bearing a fringe of short, pale hairs; mesonotum greyish yellow with a narrow, dark brown median line, the sternites and pleurites clear, light grey; abdominal tergites with a broad, dark brown, median line; wings reddish brown; petiole of cell M_1 very short or lacking; pile on the body short, not conspicuous as in *parrii.*

MALE.—Length, 14–15 mm.; wing, 11–12 mm.

Palpi short, dark brown. Frontal prolongation of the head light brown, short; nasus distinct. Antennæ (Pl. II, fig. 13) dark brown, segment one elongate, transversely wrinkled; segment two cyathiform; segment three elongate, broader distally; segments four to seven broad basally with a transverse row of pale hairs before mid-length of the segments, on the ventral face with one or two small spicules; terminal segments gradually attenuated. Vertex greyish brown, with numerous black bristles that are lacking on the median line; vertex produced forward on the median line into a tongue between the antennal bases; genæ with numerous black, bristle-like hairs.

Mesonotal praescutum yellowish grey, brightest before the pseudosutural foveæ, the three usual thoracic stripes not distinct, only a very narrow dark brown median line running the entire length of the mesonotum. Dorsal pleurites concolourous with the notum; sternal pleurites and sternum clear light grey. Halteres dark brown. Legs with the coxæ clear light grey; trochanters brown; femora brown; tibiæ similar, darker at the tips; tarsi dark brown. Wings with a strong reddish brown tinge, cells *C* and *Sc* more saturated; stigma brown; the membrane along vein *Cu* more greyish; venation (Pl. I, fig. 8) *Rs* elongate; cell M_1 sessile (as in the genus *Nephrotoma*) or very short-petiolate.

Abdominal tergites reddish brown with a broad, distinct, dark brown, median line; caudal margins of the segments less distinctly brownish; a narrow, sublateral, brown line; extreme lateral margins narrowly dull yellow. Sternites somewhat similar, the basal two-thirds reddish brown, the apical third dark brown; a very narrow and indistinct median brown line. Male hypopygiu with the ninth tergite (Pl. II, fig. 27) short, rather tumid, the caudal margi with a broad, U-shaped, median notch, the caudal margin densely provide with short, black hairs; beneath the tergal lobes, between the pleurites, ar two small rounded lobes that are densely set with short black bristles. Nint pleurite extensive, oval, with numerous hairs; outer pleural lobe (Pl. II, fig. 22 almost circular in outline, the outer face with numerous short hairs; inner pleural lobe (Pl. II, fig. 25) of rather simple structure, two armed, the outer arm directed caudad, at its tip forming a blackened chitinized hook; the inner arm is directed proximad and slightly dorsad, the blunt apex bent very slightly cephalad, almost the whole appendage with dense, pale hairs that are short or absent on the apex of the lobe, longest on the inner margin; viewed from above it is seen that this inner arm sends out a lobule on the inner dorsal side before the apex; the dorsal margin of this lobule is narrowly but heavily chitinized. Suture between the ninth sternite and pleurite not very distinct, the sternal region destitute of hairs.

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[1] Kansas University Quarterly, vol. 2, p. 64; 1894.

Locality: Holotype, ♂, west of Konganevik, Camden bay, Alaska, June 1914 (F. Johansen). No. 634. Paratopotypes, seven ♂'s, Nos. 635, 636, June 1914; Nos. 433, 437, 439, 440, and 441, July 4, 1914.

Genus **Nephrotoma** Meigen.

Nephrotoma Meigen; Illiger's Magazine, p. 262; 1803.

Nephrotoma arcticola, n. sp.

General colouration black; abdominal tergites with an interrupted orange-yellow stripe on either side of the median line; wings hyaline with the stigma dark brown; a brown cloud at the end of the sector.

MALE.—Length, 12·5-13 mm.; wing, 12-13·2 mm.

FEMALE.—Length, 14 mm.; wing, 13 mm.

Palpi black. Frontal prolongation of the head short, black; nasus elongate, black. Antennæ black, the basal enlargement of the flagellar segments not conspicuous (Pl. II, fig. 14). Head broad, black, faintly shiny; the vertex surrounding the antennal bases yellow.

Pronotal scutum black, scutellum yellowish. Mesonotum black, faintly shiny; in some specimens a narrow yellowish line on the praescutum near the suture and a yellowish mark before the pseudosutural foveæ indicate the usual yellowish ground-colour of the thorax in this genus of flies. Pleura black, faintly dusted with grey; dorso-pleural membranes dull yellow, a linear yellowish mark on the side-pieces of the mesonotal postnotum just in front of the halteres. Halteres dark brown, the head somewhat yellowish. Legs with the coxæ dusted with grey; remainder of the legs dark brown. Wings whitish hyaline, the costal and subcostal cells not brighter; stigma small, dark brown; a paler brown cloud at the end of the sector, extending down to cell *first* M_2; indistinct seams along *Cu* and its branches; veins black; venation (Pl. I, fig. 6) *Rs* rather long for this group of flies, a little longer than R_{2+3}; cell M_1 sessile or very short-petiolate.

Abdomen greyish black; lateral margins of the tergites very narrowly paler, in some specimens a broad, interrupted, sublateral orange-yellow stripe on either side of the mid-dorsal line. Male hypopygium with the ninth tergite (Pl. III, fig. 28) quadrate, the caudal margin with a small, deep, U-shaped, median notch, the lateral lobes squarely truncated, finely spiculose, the outer lateral angle with a blunt point that is minutely toothed beneath. Outer pleural appendage (Pl. III, fig. 29) an elongate-oval lobe that is produced into a blunt point at the tip; inner pleural appendage chitinized and at its tip produced into a short beak; pleural suture rather long, at its inner end curved slightly dorsad. Eighth sternite with the caudal margin broadly concave, the lateral angles bearing small tufts of hairs.

The female is similar but of a less heavy build; the abdominal tergites have the same orange-yellow stripes on either side of the broad median area, these most conspicuous on segments three to five where they appear as bright triangles.

Locality: Holotype, ♂, Bernard harbour, Northwest Territories, July 1-14, 1916 (F. Johansen). No. 425. Allotopotype, ♀, July, August, 1915. No. 823. Paratopotypes, five ♂, ♀, Nos. 419, 429, July 1-14, 1916; Nos. 824, 825, and 827, July-August, 1915.

This interesting Arctic *Nephrotoma* belongs to the same group as the Palæarctic *N. pratensis* (Linnæus) and *N. nox* (Riedel) and the *N. penumbra* Alexander from the high mountains of Northeastern North America. I have seen specimens of a species of this same group from Greenland that are close to *pratensis* but seem to represent a new species.

Genus **Tipula** Linnæus.

Tipula Linnæus; Systema Naturæ, edition 10, p. 585; 1758.

The present collection included seven species of this genus, the only described one being the common and apparently widely distributed *Tipula arctica* Curtis. I expected that *T. pratorum* Kirby[1] would be found amongst the material but such was not the case, there being no species having the antennal scape yellow. The only species in this collection with any yellow on the antennæ is *T. diflava* which does not agree at all with Kirby's rather unsatisfactory description.

Tipula johanseni, n. sp.

Antennæ black; head grey, along the inner margin of the eye broadly paler; thoracic dorsum with four dark brown stripes; wings with the tip of vein R_2 pale, subatrophied; crossvein *m* obliterated by atrophy.

MALE.—Length, 11·8 mm.; wing, 12·4 mm.

Palpi black. Frontal prolongation of the head dark grey, the nasus short, blunt. Antennæ (Pl. II, fig. 15) black; first segment of the scape relatively short, not as long as the first flagellar segment; flagellar segments rather elongated, the basal swelling oval, shorter than the remainder of the segment. Head dull grey, paler along the inner margin of the eye; sides of the vertex with scattered long, coarse bristles.

Thoracic dorsum dull grey with four dark brown stripes, the median pair narrow, separated from one another by a broad stripe of the ground colour. Pleura dark grey, the dorso-pleural membranes dull yellowish. Halteres rather long, brown, the knobs still darker brown. Legs with the coxæ dull grey and provided with long pale hairs; trochanters black; remainder of the legs broken. Wings light grey, the costal and subcostal cells a little more yellowish; stigma brown; an indistinct dark cloud at the tip of *Rs*; veins dark brown; venation (Pl. I, fig. 11) tip of vein R_2 pale, subatrophied; crossvein *m* obliterated or nearly so.

Abdominal segments blackish, the caudal and lateral margins broadly paler; hypopygium yellow. Male hypopygium with the ninth tergite (Pl. III, fig. 32) not prominent, the sides oblique, the caudal margin very deeply split by a V-shaped median notch that extends almost to the eighth tergite, the lobes thus formed long, subacute. Ninth pleurite extensive, subtriangular, the caudal angle extended out into a short blunt point; outer pleural appendage not prominent, cylindrical to slightly flattened, with long golden hairs; inner pleural appendage greatly compressed. Ninth sternite profoundly incised beneath by a V-shaped notch, beneath the margin of the eighth sternite a small brush of long golden hairs. Eighth sternite unarmed.

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[1] Fauna Boreali-Americana, Insecta, p. 310; 1837.

Locality: Holotype, ♂, Bernard harbour, Northwest Territories, July 10, 1916 (F. Johansen). No. 213.

Similar to *T. aperta* Alexander (*imperfecta* Alexander, preoccupied) of Labrador in the open cell *first* M_2, but distinct in the dark frontal prolongation of the head, the uniformly dark antennæ, the blackish trochanters and abdomen, etc. In *aperta* the tip of R_2 persists for its entire length and the petiole of cell M_1 is very much longer than in the present species.

This interesting species is dedicated to the collector, Mr. F. Johansen.

Tipula diflava, n. sp.

General colouration grey; antennæ black, the second segment abruptly yellow; abdominal tergites orange with three broad black stripes; wings clouded with brown and grey; male hypopygium with the ninth tergite large, the caudal margin deeply notched medially and with a small acute tooth at the base of the notch.

MALE.—Length, 14 mm.; wing, 14·1 mm.

FEMALE.—Length, 20–22 mm.; wing, 17·2–18·3 mm.

Palpi black. Frontal prolongation of the head black, the nasus elongate. Antennæ (Pl. II, fig. 16) with the first scapal segment narrow basally, enlarged distally, black, yellowish at the apex; segment two yellow; flagellum black, the flagellar segments with the basal swelling prominent with about four conspicuous bristles. Head black, dark grey pruinose.

Thorax grey, the mesonotal praescutum with three broad darker grey stripes, the middle one split by a line of the ground-colour; hairs on the thoracic interspaces short, pale, not conspicuous. Halteres yellow, the knobs dark brown, the apices a little brighter. Legs with the coxæ dark grey; trochanters brown; femora brownish yellow broadly tipped with black; tibiæ and tarsi dark brown. Wings subhyaline, clouded with brown and grey; cells *C* and *Sc* yellowish; stigma dark brown; a dark brown spot at the origin of *M*, origin and end of the sector; apex of the wing brownish grey, interrupted by cell $R^5/_5$ which is nearly hyaline; conspicuous, brownish grey clouds along vein *Cu*, in the middle and end of cell *M* and including most of cell Cu_1; apices of the anal cells largely grey; in the male the pattern is the same but paler; venation (Pl. I, fig. 9), pattern omitted.

Abdomen with the first tergite black; second to sixth orange, with three broad black stripes, a narrow median one, broadening out behind and two sublateral stripes; on the caudal margins the black stripes tend to be confluent interrupting the orange; terminal segments largely blackish; lateral margins of the tergite pale yellowish; hypopygium mostly blackish; sternites largely black. Male hypopygium (Pl. III, fig. 34) with the ninth tergite (Pl. III, fig. 33) extensive, the caudal margin with a very deep V-shaped notch, at the base of which is a tiny tooth that sends a carina cephalad onto the dorsum of the sclerite; lateral lobes thin, rounded at their apices. Ninth pleurite complete, moderately large; outer pleural appendage elongate, flattened-cylindrical, pale, with a dense covering of long hairs; inner pleural appendage flattened into an extensive blade, the margin with sharp teeth.

The female is similar but larger; valves of the ovipositor slender, elongate, acicular, not at all like the *arctica* type where the tergal valves are flattened transversely with the outer margin toothed and the sternal valves are very minute.

Locality: Holotype, ♂, Bernard harbour, Northwest Territories, July 12, 1915 (F. Johansen). No. 790. Allotype, ♀, Herschel island, Yukon Territory, July 1916. No. 838. Paratype, ♀, with the allotype. No. 839.

Tipula arctica Curtis.

Tipula arctica Curtis; Description of the insects brought home by Commander J. Clark Ross. Appendix to Ross's Voyage to the Arctic regions, p. lxxvii, Plate A, fig. 15; 1831.

MALE.—Length, 13–17 mm.; wing, 13·5–17·5 mm.

FEMALE.—Length, 20–21·5 mm.; wing, 16–17 mm.

Palpi dark brown. Frontal prolongation of the head rather elongate, blue-grey; nasus stout. Antennæ (Pl. II, fig. 17) deeply serrate, each segment of the flagellum deeply incised beneath, the apical enlargement being only a little smaller than the basal swelling but not provided with verticils. Head blue-grey.

Mesonotal praescutum dull grey with three broad blue-grey stripes, the median one often narrowly split by a vitta of the ground-colour; these stripes are sometimes narrowly margined with brown; the thoracic interspaces with numerous black setigerous punctures; remainder of the thorax blue-grey including the coxæ of the legs. Halteres brown, the knobs darker. Legs with the femora reddish yellow broadly tipped with dark brown; tarsi dark brown. Wings subhyaline with conspicuous brown and grey markings, cells *C* and *Sc* a little more yellowish; a small brown spot at the origin of *Rs*; stigma large, sending a cloud down the cord to cell *first* M_2; greyish brown clouds in the anal cells, at the base of cell *Cu*, at midlength and at the end of *M* and in the apex of the wings; venation (Pl. I, fig. 10).

Abdominal tergites in the male with segment one, black; two to four, reddish yellow with broad sublateral stripes and an indistinct median stripe brownish grey; remaining segments dark brownish grey; sternites two to four, reddish yellow, broadly darkened laterally; terminal sternites brownish grey; the segments of the abdomen are very narrowly and indistinctly margined with paler. Male hypopygium with the ninth tergite (Pl. III, fig. 35) small with a deep and broad rounded caudal notch, the dorsum rounded into a saucer, the lateral lobes with four or five blunt teeth. The inner pleural appendage is illustrated (Plate III, fig. 37).

The female is similar to the male in most respects, but the abdomen is differently coloured being dull grey with a broad, dark brown, interrupted, dorso-median stripe; the basal tergites a little brightened on either side of the dorso-median line; abdomen not excessively elongated as in the related *T. longiventris;* dorsal shield jet-black, shiny; tergal valves of the ovipositor brownish black. The ovipositor (Pl. III, fig. 43) has the dorsal shield elongate, a little longer than the tergal valves of the ovipositor; these tergal valves have about fifteen teeth along the outer lateral margin; the sternal valves are very reduced as in this group of species, acicular, the pair forming a sublyriform organ (Pl. III, fig. 40).

This was the most abundantly represented species in the collection including nearly one-half of the material, as follows:—

Localities: West of Konganevik, Camden bay, Alaska, July 4, 1914 (F. Johansen). Four ♂'s, Nos. 196–199. Port Epworth, north of Tree river, Coronation gulf, Arctic Canada, July 16, 1915 (J. J. O'Neill). Two ♂'s, Nos. 102 and 104; one ♀, No. 103. Bernard harbour, Northwest Territories, June 21, 1915, one ♂, No. 1328; July 4, 1915, one ♀, No. 1076; July 7, 1915, one ♂, one ♀, Nos. 1233, 1234; July 12, 1915, two ♀, Nos. 756, 789, one ♂, No. 757; July 19, 1915, ♂, ♀, Nos. 1266, 1267; July 22, 1915, ♂, ♀, Nos. 1062, 1063; July-August, 1915, six ♂, ♀. Nos. 829–834; July 1–14, 1916, seven ♂, ♀, Nos. 420, 421, 424, 426, 427, 428, and 430.

Unless stated otherwise the material was taken by Mr. Johansen. Pupæ are pinned with Nos. 197, 199, and 834.

The immature stages of this interesting crane-fly will be considered on pages 18 and 19, under the second part of the report, on the immature stages.

Most species of the genus *Tipula* hold the wings outspread or divaricate in a position of rest. Apparently but few hold them folded incumbent over the abdomen. Two excellent photographs by Mr. G. H. Wilkins, taken at Bernard harbour in July, 1915, show that *T. arctica* falls in this latter group of species. These illustrations show the female fly crawling about over the Arctic vegetation, possibly searching for a place in which to oviposit. (Plate VI).

Tipula hewitti, n. sp.

General colouration grey; mesonotal præscutum with three broad brown stripes; halteres tipped with yellowish orange; legs with the femora dull brownish yellow, broadly tipped with dark brown; wings very indistinctly marked with greyish clouds; male hypopygium with the ninth tergite very narrowly notched medially, the lateral lobes almost contiguous.

MALE.—Length, 13 mm.; wing, 15 mm.

Palpi black. Frontal prolongation of the head short, dark grey; nasus broad, prominent. Antennæ black, the first segment of the scape dusted with grey; flagellum broken. Head grey, the disk of the vertex more brownish; vertex produced cephalad between the antennal bases into a flat tongue that is deeply split by a median groove.

Mesonotum grey, the præscutum with three dark brown stripes, the middle one very broad in front, rapidly narrowed to near the suture, indistinctly split by a grey median vitta; lobes of the scutum with a linear brown line. Pleura grey, the dorso-pleural membrane dull brownish. Halteres brownish yellow, the knobs dark brown tipped with dull yellowish orange. Legs with the coxæ grey; trochanters dark brown; femora dull yellow, the tips broadly dark brown; tibiæ and tarsi dark brown. Wings dull grey; the costal and subcostal cells more yellowish; stigma brown; a yellowish spot beyond the stigma in cell *second* R_1; indistinct grey clouds along vein *Cu;* venation: petiole of cell M_1 short; crossvein *m-cu* obliterated by the fusion of Cu_1 on M_{3+4}.

Abdomen dark greyish black, the terminal tergites ringed with paler, the lateral margins indistinctly paler. Male hypopygium with the ninth tergite (Pl. III, fig. 36) large, subquadrate, the caudal margin nearly transverse with a very narrow median notch, the adjacent lobes slightly produced caudally at their inner angle and almost touching one another. Ninth pleurite complete; outer pleural appendage (Pl. III, fig. 30) elongate-oval, the apex broadly rounded, the basal two-thirds dusky, the apical third yellowish. Ninth sternite with a deep median notch.

Locality: Holotype, ♂, Bernard harbour, Northwest Territories, July 1-14, 1916 (F. Johansen). No. 418.

I take great pleasure in dedicating this species to Dr. C. Gordon Hewitt, the Dominion Entomologist, to whom I am indebted for many favours.

Tipula subpolaris, n. sp.

MALE.—Length, 13·5 mm.; wing, 13·6 mm.

In most respects very similar to *T. hewitti*, but the male hypopygium is quite different. Unfortunately the type is badly discoloured. The antennæ (Pl. II, fig. 18) have the flagellum black, the individual segments moderately elongated, the basal enlargement being about half as long as the rest of the segment. Tibial spurs long and slender. Basal abdominal tergites with indications of orange on the sides of the median black line. Male hypopygium with the ninth tergite (Pl. III, fig. 38) black, the caudal margin with a broad U-shaped notch. Ninth pleurite complete, black, broadly margined with yellowish; outer pleural appendage subelongate, narrowed toward the apex, dusky basally, passing into rather bright yellow beyond.

Locality: Holotype, ♂, Bernard harbour, Northwest Territories, July-August 1915 (F. Johansen). No. 826.

This species is certainly close to *T. hewitti*, but I cannot make the two agree. Unfortunately each species is represented only by the unique male type and I do not care to remove the abdomen to submit the male genitalia to the critical study that some day may be necessary. More material from the Arctic north-west would probably decide the status of these two species which are closely allied but which certainly appear to be distinct.

Tipula besselsoides, n. sp.

General colouration grey; antennæ rather short, black; body clothed with conspicuous erect hairs; femora light yellowish, tipped with black; ninth tergite of the male hypopygium with a small, U-shaped notch, the lateral lobes rounded.

MALE.—Length, 12 mm.; wing, 15·5 mm.

Palpi black. Frontal prolongation of the head greyish black; nasus prominent. Antennæ (Pl. II, fig. 19) black; first segment of the scape long and slender, clothed with numerous outspreading hairs; flagellar segments very short, the basal swelling of the individual segments being about equal to the remainder of the segment. Head broad, eyes rather small, widely separated; vertical tubercle low; head dark grey with scattered setigerous punctures.

Thorax dark grey, the præscutum with three indistinct, darker grey stripes; thoracic interspaces with an abundant coarse, black hair. Halteres dull brownish yellow. Legs with the coxæ grey clothed with numerous long pale hairs as in *besselsi* O.S.; trochanters dark; femora light brownish yellow, the tips broadly black; tibiæ light brown, the tips broadly black; tarsi dark brown. Wings nearly hyaline, the subcostal cell more yellowish; stigma brown, oval; apex of the wings a little darkened; veins dark brown; obliterative streak extending from before the stigma into cell M_4; venation: crossvein *m-cu* not far beyond the fork of *M*.

Abdomen dark grey, the segments conspicuously ringed with pale yellowish; lobes of the hypopygium yellow. Male hypopygium with the ninth tergite (Pl. III, fig. 39) rather extensive, the caudal margin somewhat rounded and with a deep, U-shaped, median notch; at the inner margin of the lateral lobes a small tubercle; entire sclerite black, clothed with numerous short, appressed hairs; suture between the tergite and sternite well-defined. Ninth pleurite small, incomplete, the suture indicated only beneath; outer pleural appendage (Pl. III, fig. 31) a small, suboval flattened lobe pale brownish yellow, the outer face with abundant long pale hairs; inner pleural appendage (Pl. III, fig. 42) elongate, chitinized, at the base a rounded knob clothed with long, delicate pale hairs, the outer margin with four stout bristles. Penis-guard a long, straight chitinized point, gradually narrowed from the base to the acute apex.

Locality: Holotype, ♂, Bernard harbour, Northwest Territories, July 1–14, 1916 (F. Johansen). No. 422. Paratopotype ♂. No. 417.

This species bears a strong superficial resemblance to *T. besselsi* Osten-Sacken in the grey colouration with conspicuous long, erect pile; the legs are differently coloured and the hypopygium of the male is very differently constructed in the two species. It also resembles *Stygeropis parrii* (Kirby) superficially in colouration and the erect pile, but the verticillate antennæ and nearly hyaline wings of the present species offer easy points for separation.

Tipula subarctica, n. sp.

Related to *T. pribilofensis* Alexander; general colouration dark; abdomen reddish brown with a dark median stripe on both the tergites and sternites; ninth tergite of the male hypopygium prominent with flattened, acute, lateral arms; eighth sternite produced caudad into a broad, flattened, shovel-like, median lobe.

Male.—Length, 12·5 mm.; wing, 14 mm.

Head discoloured. Antennæ broken.

Pronotal scutum dark, the scutellum dull yellowish. Mesonotal præscutum dark coloured, almost black in the type, but badly discoloured, the thoracic stripes, if present normally, being obliterated; normal specimens are almost certain to be very dark grey. Pleura blackish, grey pruinose; dorso-pleural membranes dull yellow. Halteres brown, the knobs darker. Legs with the coxæ black, grey pruinose; trochanters brown; femora reddish brown, the tips narrowly and indistinctly darkened; tibiæ brown, the apices blackened; tarsi dark brown. Wings nearly hyaline, the costal and subcostal cells concolourous with the rest of the wing; veins brown; wings in the vicinity of the stigmal region injured; venation: R_2 persistent for its entire length; the *m-cu* crossvein inserted just beyond the fork of *M*. The fly is full-winged.

Abdominal tergites reddish brown with a broad, black, median stripe; ninth tergite black; sternites dull brown with an interrupted blackish median stripe. Male hypopygium with the ninth tergite (Pl. III, fig. 41) very large and prominent, black, chitinized, the caudal margin with an acute, V-shaped, median notch, finely denticulate, the lateral angles produced far caudad into flattened ears. Ninth pleurite incomplete, the suture indicated beneath, an acute dorso-caudal arm of the pleurite runs beneath the tergal lobes. Eighth sternite with a broad, shovel-shaped, median lobe extending caudad and dorsad, its caudal margin evenly and gently notched and provided with short, delicate hairs. Eighth tergite completely concealed beneath the seventh tergite.

Locality: Holotype, ♂, west of Kongenevik, Camden bay, Alaska, July 4, 1914 (F. Johansen). No. 442.

This interesting new species is related to *T. pribilofensis* Alexander from the Pribilof islands off the western coast of Alaska. It is an entirely distinct species, being full-winged and the male hypopygium quite differently constructed although both species have the curious spoon-like elongation of the eighth sternite. I have seen another species of the same group from Kamchatka, eastern Siberia *Tipula kamchatkensis* Alexander.

Very recently I have received from Prof. Hine another specimen in much better condition. This specimen may be considered as paratypical and the following additional characters should be noted:

Male:—Length, 14 mm.; wing, 13 mm.

Frontal prolongation of the head dark purplish brown above, more yellow laterally. Antennæ rather long, the scape a very little paler than the dark brownish black flagellum; flagellar segments rather deeply incised beneath. Head light grey, a small brownish blotch on the disk of the vertex. Eyes small; genæ prominent.

Mesonotal stripes very indistinct, brown, ground-colour of the mesonotum light grey. Pleura light grey, the dorso-pleural membranes light yellow.

Paratype, ♂, Katmai, Alaska, July, 1917 (J. S. Hine).

Specimen in the collection of Prof. Hine.

Family RHYPHIDÆ.

Subfamily TRICHOCERINÆ.

Genus Trichocera Meigen.

Trichocera Meigen; Illiger's Magazine, vol. 2, p. 262; 1803.

At the present time this genus of flies offers almost insuperable taxonomic difficulties. Some twenty-five or thirty species have been proposed, but that very many of these are synonyms of others is unquestioned. It seems now that the only hope of straightening this apparently hopeless tangle is for some

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Journal of the New York Entomological Society, vol. 26, p. 72; 1918.

European student to critically study the existing types and compare the authenticated Palæarctic species with a great series from America and elsewhere. If this is done it may be that the correct synonymy can be determined. It is scarcely possible for an American worker to attempt the problem, at least under present European conditions, chiefly because of the impossibility of studying the types of the European species still existant and the added difficulty of obtaining authentically named specimens of the European species, the European specialists, apparently, being as much in doubt concerning the true status of the group as are the American workers.

Until a very recent date the genus *Trichocera*, together with the related genus *Ischnothrix* Bigot, from Cape Horn, was included as a member of the Tipulid tribe, Limnophilini. A critical study of the immature stages by Johannsen, Keilin, de Meijere, Malloch, and others has shown the utter impossibility of such an assignment and it seems better to give it subfamily rank in the family Rhyphidæ.

Trichocera sp.

The present collection included three specimens of *Trichocera* sp., from Bernard harbour, Northwest Territories, June 18, 1915, collected by F. Johansen; two males, Nos. 1301 and 1302 and a female, No. 1300 D.

IMMATURE STAGES.

The present collection of Canadian Arctic crane-flies included a surprising amount of life-history material. This was of very great interest since our knowledge of the younger stages of any Arctic crane-flies is almost negligible. Unfortunately, very little of the material had been reared and consequently the placing of the species has been attended with considerable doubt and difficulty. As a rule it scarcely pays to describe or figure undetermined larvæ or pupæ unless they show conspicuous points of difference in their structure, have a peculiar habitat, or else, as in the present case, come from a region where practically nothing is known concerning the early stages. These Arctic crane-flies, especially of the Tipuline group, are sometimes as beautifully patterned in the larva as they are dull and obscure in the adult. The biological data that were supplied by the collector are incorporated with each species concerned.

HEXATOMINI.

In another paper, not yet published, I have endeavoured to correlate the present classification of crane-flies, based entirely on a study of the adult flies, with a critical survey of all the immature stages that I could obtain. Among other things this study seems to indicate that the tribe Hexatomini is not as clearly set off from the related groups as a study of the adults alone would imply. Several of the groups that have hitherto been considered subordinate groups of the genus *Limnophila*, such as *Ulomorpha*, *Lasiomastix*, *Dicranophragma*, *Poecilostola*, etc., all seem now to be more properly referable to the Hexatomini, or at least closely allied to *Eriocera*, *Penthoptera*, etc. The present species has not been reared and its true affinities must be left in doubt, but I believe that the reference given below will be not entirely erroneous.

Poecilostola supposition.

This is a small group of flies including seven or eight species of the Palæarctic region with representatives occurring in Japan. Although no adults of this group of flies or, indeed, any of its relatives have yet been taken in the Canadian Arctic I feel very little hesitation in referring the present larva to the neighbourhood of this genus. It may belong to the subgenus *Phylidorea* Bigot of the genus *Limnophila* Macquart.

Locality: One large larva taken in the melted ponds in the tundra at Demarcation point, Alaska, May, 1914 (F. Johansen).

Length, 19·5 mm.; diameter, 2·4 mm.

Form cylindrical, the anterior segments narrower, the abdominal segments just before the cauda swollen. Body with a covering of short and delicate appressed hairs. Head-capsule of the long narrow structure of the tribe; mandibles (Pl. V, fig. 55) long, sickle-shaped; maxilla (Pl. V, fig. 54, with the outer lobe projecting from the oral opening when the head is completely retracted. Colouration uniform light yellow throughout. Spiracular disk (Pl. IV, fig. 44) small, with four lobes, the lateral and ventral pairs. Lateral lobes rather short and blunt, the ventral edge with an irregular linear brown mark, the outer edge with a dense fringe of long hairs; ventral lobes longer with a long, arcuate, brown line down the inner face; outer edge with a dense fringe of long hairs, those at the tip being very elongate. Anal gills four, short, blunt, oval.

TIPULINI.

A considerable number of Tipuline forms were included in the present collection. Only one of these, *Tipula arctica* Curtis, was reared and the generic reference of the remainder must be considered as being somewhat doubtful. I have studied each of these species, however, in the light of our knowledge of other life-histories, and have placed them as closely as the data will warrant.

Tipula arctica Curtis.

Locality: Larvæ in the ground at Bernard harbour, Northwest Territories, May 27, 1916 (F. Johansen).

A male collected as a larva on May 27 pupated about June 20. (Rearing No. 106.)

Larvæ. Length, 23-25 mm.; diameter, about 4 mm.

Form cylindrical. Mouth-parts with the mentum (see Pl. V, fig. 53) long and slender with a large, blunt, median tooth and two smaller teeth on either side; directly beneath these lateral teeth similar subequal teeth are (hypopharynx) visible. Labrum as in Pl. V, fig. 52.

Chætotaxy: Dorsal surface, a transverse row of delicate hair-like setæ across the dorsum of the last thoracic segment and the abdominal segments, there being usually four of these punctures on the first three segments occurring at about mid-length of the segments; on the abdomen they lie on the posterior ring of each segment (see Pl. V, fig. 56); the lateral puncture bears two bristles, the inner punctures a single seta; they correspond exactly to the condition of the ventral segments except that here the solitary anterior bristle has moved caudad into alignment with the posterior paired bristles. In some there are a few weak supplementary bristles in the same line. Ventral surface (Pl. V, fig. 57) similar; two prominent widely separated setigerous punctures, each with two long bristle-like hairs nearer the caudal margin and two other smaller and more delicate bristles slightly cephalad and closer to the median line; these anterior ventral bristles are separated from one another by a distance that is a little less than the distance between them and the larger posterior bristles; on the lateral margin of the segment there is usually a more delicate hair.

Colouration dull yellow, the thoracic segments with abundant, tiny, appressed dark hairs that give a darker appearance to the anterior end of the body.

Spiracular disk (Pl. IV, fig. 45) surrounded by six short lobes, a dorsal pair, rather closely approximated medially, a dorso-lateral pair and a ventral pair. The dorsal pair are shorter than the lateral pair and the inner face in most specimens has a straight or slightly curved, dark brown, line. The lateral lobes are longer and more slender. The ventral lobes are short and broad.

The spiracles are very large and conspicuous, black. In some specimens there are two black dots just above each spiracle and two somewhat similar dots below the spiracles and on the ventral lobes; of these markings the ventral dots are the most constant. Anal gills, four in number, blunt, fleshy.

PUPÆ. Male: Length, 18 23 mm.; dorso-ventral depth, 3·8 4 mm.; dextro-sinistral width, 3·2 mm. Female: Length: 23 mm.; depth and width 4 mm.

MALE. (Pl. V, fig. 50): Colouration brown, the abdomen more yellowish brown; the pleural membrane paler; the breathing-horns, appendages, and sheaths dark brown; spines on the abdomen black.

Antennal bases situated on a high crest, elevated above the level of the breathing-horns. Pronotal breathing horns not conspicuous, short, directed slightly forwards and slightly divergent. On the pronotum a small knob just before the breathing horns; on the præscutum two widely separated tubercles and just behind these but nearer the median line, two smaller tubercles, the space between these tubercles connected by a row of crenulations. Leg-sheaths reaching to the middle of the third abdominal segment; wing-sheaths reaching the base of the second abdominal segment.

Abdominal tergites: segments 1 and 2 with a small tubercle on the caudal ring on either side of the median line; segment 3 with two tubercles on either side, the inner one largest; segments 4 to 6 with three or four tubercles on either side, the inner one largest; segment 7 narrowed, with two lateral spines and two separated blunt tubercles; segment 8 narrowed, the lateral angles ending in powerful tubercles with sharp points. Pleural integument coarsely punctured, on the edge nearest the sternites with a single sharp spine on the caudal ring of segment 1 and on segment 7 and two, one on each ring of segments 2 to 6. Sternites armed with circlets of powerful spines on the caudal ring, on segment 3 there being two, small and widely separated; on segments 4 to 7 there are four such spines, larger and rather approximated. Segment 9 rounded, indistinctly bifid, each side with a small, acute spine at the tip.

FEMALE. (Pl. V, fig. 51) similar to the male above described, the sexual differences being as follows: Sheaths of the tergal valves of the ovipositor elongate, powerful, lying parallel to one another, transversely wrinkled; sheaths of the sternal valves of the ovipositor tiny, located at the apex of the eighth segment.

Mr. Johansen has recently called my attention to the description and figures of the immature stages of this species by Dr. T. C. Nielsen.[1] As there are some discrepancies between the descriptions and figures of the material from northeast Greenland and that from the Canadian Northwest, it is possible that more than one species is involved under the name of *Tipula arctica*.

Stygeropis, possibly **parrii** (Kirby).

Locality: Melted ponds in the tundra at Demarcation point, Alaska, May 1914 (F. Johansen).

Two smaller specimens measure as follows: length, 20 to 24 mm.; diameter, 2·2 to 2·5 mm.

A larger larva (No. 5a), length, 38 mm.; diameter, 3·7 mm.

Form cylindrical, moderately elongated. Head-capsule with the antennæ long and slender, from three to four times as long as thick, cylindrical, yellowish.

Chætotaxy: Setæ very weak and delicate, on the thoracic segments being tiny lateral hairs. Abdominal tergites (Pl. V, fig. 58) with no setæ on the anterior ring; on the posterior ring with the following bristles: a small lateral bristle nearest the false suture; just before the caudal margin of the segment a more or less impressed line, at its outer end with two or three bristles arising from individual punctures; on either side of the reddish dorso-median vitta a prominent

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[1] The Insects of the "Danmark" Expedition: Meddelelser om Grönland, vol. xliii, Copenhagen, 1910 pp. 57-9, Pl. vii, figs. 1-7.

seta directed proximad; on the penultimate and antepenultimate segments of the abdomen the bristles are very long and delicate. The sternites (Pl. V, fig. 59) similar, but the median bristles lie further cephalad and there is a smaller tiny bristle in its individual puncture just proximad of it; these median bristles are almost in alignment with the lateral bristles. The caudal bristles, three in number, are in alignment and rather widely separated.

Colouration above dark brown, the thoracic region more reddish; a broad, conspicuous dorso-median stripe reddish brown; lower surface greyish with a reddish caste. Skin very smooth without tubercles or roughenings of any sort. The sutures between the individual segments are very well-marked but not conspicuously constricted, at about two-thirds the length of each abdominal segment with a pseudosuture dividing the segment into two rings or annuli.

Spiracular disk (Pl. IV, fig. 46) surrounded by six very long, finger-like lobes, of which the ventral pair are slightly the longer. All the lobes are margined with dark brown and here develop long fringes of delicate pale hairs which are longest at the tips of the lobes, much shortened toward the base of the lobes; down the middle of the inner face of each lobe there is a long, narrow, black stripe extending from the tip back toward the centre of the disk, this mark longest on the ventral lobes; the lateral marks on the lobes are all expanded at their inner ends nearest the spiracles, the outer margins of the ventral lobes united with one another across the disk, between the spiracles, by a narrow, arcuated line. Spiracles large. Anal gills short but slender, inconspicuous, the inner pair very short.

From its great resemblance to the larva of *Stygeropis fuscipennis* Loew of northeastern America I would refer this larva to *Stygeropis* without question. Which species it represents is somewhat doubtful, but very probably either *parrii* or *parrioides*. The *Tipula* No. 1 of Malloch's preliminary classification[1] is *Stygeropis fuscipennis*.

Tipuline No. 1 (**Stygeropis,** supposition).

Locality: Two larvæ from a lake near Bernard harbour, Northwest Territories, June 25, 1915 (F. Johansen).

Two additional specimens from Demarcation point, Alaska (melted ponds in tundra, May, 1914. No. 7).

Length, 20·5-23 mm.; diameter, 1·8-2 mm.

Form cylindrical, moderately elongated, the anterior end abruptly tapering, the posterior end gradually tapering to the cauda; caudal lobes capable of close application to one another along their inner faces, protecting the spiracles.

Chætotaxy: Dorsal segments (Pl. V, fig. 60) with the setæ all on the posterior ring, an anterior lateral pair located in the lateral yellow line, consisting of two punctures, the more lateral one of which has a tripartite bristle, the proximal one simple. Nearer the caudal margin of the segments three long lateral bristles in alignment and rather widely separated, the distal one located near the inner margin of the yellow stripe, the inner two closer together located in the black lateral stripes, the innermost on its margin. In alignment with these three and located nearer the mid-dorsal region of the segment, one on either side of the apex of the shield-shaped dorsal mark, are two long bristles. All of these caudal bristles are in alignment with the caudal setæ of the ventral segments.

Lateral setæ: On the dark pleural stripe a group of three small, stout bristles on the posterior ring, arranged in a triangle; a single, longer hair on the anterior ring of the segment, much closer to the ventral edge than to the dorsal edge of the stripe.

Sternal segments with the setæ on the apical ring of the segment arranged as in Pl. V, fig. 61; there are two anterior setæ on each side, and closer to the median line; of these the distal one is the longest, the proximal one usually very short; there are three posterior setæ on either side, the two proximal being longest and in their own punctures, the third one distal in position, lying close to the black pleural stripe and located in a very small puncture on the margin of the adjoining larger puncture.

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[1] Malloch, J. R. "A preliminary classification of Diptera based upon larval and pupal characters," Bull. Illinois State Laboratory of Natural History, vol. 12, pp. 199, 200, figs.; 1917.

Colouration: Dorsum (Pl. V, fig. 60) dull yellow. Just inside the broad lateral stripe and separated from it by a narrow bright yellow line is a narrow dark brown line, almost continuous but slightly interrupted in places; this dark line begins on the mesothorax and continues to the last segment. The dorsum of the abdomen between these dark stripes is handsomely marked with dorsal shields of brown which are narrowly margined with darker brown, the narrow apex of the shield directed caudad; there are about seven of these dorsal shields, the integument on either side of them with three bright yellow dots in straight diverging lines, all of these dots lying on the cephalic ring of the segment. Pleural region dark brown, very broad but paler on the thoracic segments, gradually narrowed and becoming darker toward the end of the body, terminating near the anal gills. This dark pleural stripe is dotted with numerous yellowish spots. Ventral surface abruptly and conspicuously light yellow.

Spiracular disk surrounded by six long, finger-like lobes, the dorsal lobes rather the shortest although still long and finger-like, lying parallel, the ventral lobes longest; all the lobes narrowly margined with black and with a slender black vitta bisecting the inner face of the lobe from the tip inward toward the disk, at the distal end expanded into a blackish apex; the apex and lateral margins bear long fringes of hairs as in *Stygeropis*, these hairs being longest toward the tips of the lobes. Anal gills six, short but rather slender, inconspicuous, the two lateral pairs longest, the inner pair much shorter.

I would refer this to a position not far removed from *Stygeropis* although it is very differently coloured from the species last described under that name. However, the structure of the larvæ seems to indicate that it is more probably a *Stygeropis* than a *Tipula* or a *Nephrotoma*. If the generic reference is correct the larvæ probably belong to either *S. parrii* or *S. parrioides*.

In the specimens from Demarcation point, Alaska, the anterior end of the body is pale and the median dorsal shields are continuous as a practically uninterrupted dorso-median line, only slightly constricted toward the posterior end of each segment; the lateral dorsal stripes are very dark. However, the structure of the spiracular disk and the chætotaxy are entirely the same and I feel sure that all the material pertains to the same species.

In the vial containing the two larvæ from Bernard harbour, described above, there was an additional Tipuline larva that is closest to the Tipuline No. 3 described later, but probably represents a still different species. Because this is the only specimen included in the material it is not further discussed in this report.

Tipuline No. 2.

Locality: Three larvæ, taken at Demarcation point, Alaska, May, 1914. No. 4 (F. Johansen); melted ponds in the tundra.

Length, 20-23 mm.; dextro-sinistral width, 3·3-3·6 mm.; dorso-ventral depth, 2-2·2 mm.

Body moderately elongated, form strongly depressed; thoracic and first abdominal segments with the margins regular; abdominal segments 3 to 8 with a prominent false constriction or pseudo-suture at about two-thirds the length of the segment, the edges of the segments produced laterad to give a serrate appearance to the margins of the abdomen; the anterior ring of each segment has the serration larger than that of the posterior ring so that these alternate; penultimate segment of the abdomen with the caudal angles produced strongly caudad into long, slender lobes.

Chætotaxy: Tergites (Pl. V, fig. 62) with setæ on the posterior ring only, these bristles short and weak, the marginal group lying in or close to the dark lateral stripe, the outer one far removed from the inner pair. Bristles of the disk single, one on either side of the median dorsal stripe. Lateral bristles with two on the posterior ring, one on the anterior ring. Sternites (Pl. V, fig. 63) with no bristles on the anterior ring; posterior ring with two bristles on either side of the median line and at about mid-length of the ring, the distal bristle longest. Nearer the posterior margin and lying farther distad, three setæ almost in a line, rather closely approximated but each one in its own distinct puncture, the proximal two longest, the distal one small and weak.

Colouration: A beautiful larva (Pl. IV, fig. 47), light yellow in colour, the thorax and lateral margins of the abdomen dusky. Three interrupted dark-brown stripes on the dorsum, on the individual segments shaped as follows: on the anterior ring the median mark is rectangular, in front not attaining the segment preceding, connected at its caudal end with the lateral stripes which are dotted with yellow, on the proximal edge clear-cut, laterally passing into the dusky of the margins of the abdomen; posterior ring of each segment with three marks more irregular and diffuse. Sternites dull yellowish with an indistinct irregular dusky square on the anterior ring, this dusky area with an arcuated line of four oval spots across the anterior third and two larger yellow blotches on the posterior two-thirds, one on either side of the median line; on the posterior ring of each segment the dusky marks are irregular, shaped somewhat like an hour-glass.

Spiracular disk (Pl. IV, fig. 48) small, surrounded by six small lobes; dorsal lobes very small but slender, slightly divergent; lateral and ventral lobes long and slender, in some the lateral lobes notably shorter than the ventral pair; inner faces of the lobes unmarked with darker. Ventral lobes with a few long, sensory bristles at the apex; a single long bristle on the ventral face at about mid-length; lateral lobes with a similar group of bristles near the tip and a longer one on the outer face near the apex. Spiracles small, widely separated. Gills six in number, small, slender, inconspicuous, the caudal pair longest, the cephalic pair with a short lobule on the basal inner side so it appears there are six gills of which four are long, two short.

I have no idea to which species this handsome larva belongs. This species and the last are amongst the most beautifully patterned larvæ that I have ever seen. The present species exhibits an unusual degree of depression for this tribe of Tipulidæ and in some respects gives strong indications of how the even more accentuated conditions in the Cylindrotominæ may have been brought about. It seems probable that this larva belongs to the genus *Tipula* rather than to any of the related genera.

Tipuline No. 3.

Locality: Tundra at Nome, Alaska, August, 1916 (F. Johansen). Three larvæ, two large and one smaller specimen.

Two additional badly shrunken larvæ bearing the following label: "*Tipula* larvæ C, about one-fourth inch below the plant-covering of the tundra behind the winter house, Collinson point, Alaska, September 20, 1913."

Length, 27·5-30 mm.; diameter, 4-5 mm.

Form plump and robust; colouration brown, the body clothed with an abundant appressed dark pubescence, the dorsal ring of each segment that bears the setæ darkest in colour; each segment is divided by 4 or 5 pale transverse false sutures so the abdomen appears multisegmented. The true limits of each segment are readily determined by the caudal row of setæ.

Chætotaxy: Tergites (Pl. V, fig. 64) with four long, powerful bristles in alignment, the median pair closer to one another than either is to the lateral seta; extending proximad from each seta is a narrow, semi-impressed line destitute of pubescence; each of the outer setigerous areas bears two closely approximated setæ. Lateral setæ two, one on each primary ring at about midlength, the anterior one lying closer to the ventral margin, the posterior one closer to the dorsal margin. Sternites (Pl. V, fig. 65) with four setigerous areas, the median pair a little anterior to the posterior pair, one on either side of the median line, each area with two stout bristles. The above pertains to the abdominal segments. On the dorsum and lateral portions of the anterior ring of the prethorax at about mid-length there are about ten setigerous areas, the median pair close together and bearing a single seta, the next pair more widely separated, each with two short setæ; the third pair closer to the second pair than they are to one another, likewise with two setæ, one long slender bristle and a shorter slender one; lateral setæ solitary, long and stout, two on each side of the prothorax. The meso- and meta-thoraces at about midlength and almost in alignment have about ten setigerous punctures, the inner six close together and shortest (the innermost simple, the outer two pairs double); lateral bristles longer and more widely separated.

Spiracular disk (Pl. IV, fig. 49) surrounded by six short lobes, not conspicuous. Dorsal lobes short, conical, situated close together on the dorsomedian line, divergent apically, broad at the base, tapering rapidly to the acute tip. Lateral lobes longest, elongate-conical, tapering to the rather acute apex. Ventral lobes short, broad, and blunt with a broad blackish blotch on the inner face, in the smaller specimen occurring as two parallel transverse lines beneath each spiracle. Gills short, blunt, dark in colour.

This is probably a species of *Tipula* rather than the related genus, *Nephrotoma*, but the immature stages of the two genera are very similar to one another.

EXPLANATION OF PLATE I.

Fig. 1. Wing of *Dicranomyia alascaensis*, n. sp.
" 2. " *Erioptera (Erioptera) angustipennis*, n. sp.
" 3. " *Limnophila (Dactylolabis) rhicnoptiloides*, n. sp.
" 4. " *Tricyphona brevifurcata*, n. sp.
" 5. " *T. frigida*, n. sp.
" 6. " *Nephrotoma arcticola*, n. sp.
" 7. " *Stygeropis parrii* (Kirby).
" 8. " *S. parrioides*, n. sp.
" 9. " *Tipula diflava*, n. sp. (pattern omitted).
" 10. " *T. arctica* Curtis.
" 11. " *T. johanseni*, n. sp.

EXPLANATION OF PLATE II.

Fig. 12. Antenna of *Stygeropis parrii;* basal and apical segments.
" 13. " *S. parrioides;* the same.
" 14. " *Nephrotoma arcticola;* basal segments.
" 15. " *Tipula johanseni;* the same.
" 16. " *T. diflava;* the same.
" 17. " *T. arctica;* the same.
" 18. " *T. subpolaris;* the same.
" 19. " *T. besselsoides;* the same.
" 20. Hypopygium of *Tricyphona frigida;* pleurite and appendages, dorsal aspect.
" 21. " *T. diaphana* (Doane); the same.
" 22. " *Stygeropis parrioides;* outer pleural appendage.
" 23. " *S. parrii;* the same.
" 24. " *S. parrii;* inner pleural appendage.
" 25. " *S. parrioides;* the same.
" 26. " *S. parrii;* ninth tergite, dorsal aspect.
" 27. " *S. parrioides;* the same.

EXPLANATION OF PLATE III.

Fig. 28. Hypopygium of *Nephrotoma arcticola;* ninth tergite, dorsal aspect.
" 29. " *N. arcticola;* outer pleural appendage.
" 30. " *Tipula hewitti;* the same.
" 31. " *T. besselsoides;* the same.
" 32. " *T. johanseni;* ninth tergite, dorsal aspect.
" 33. " *T. diflava;* the same.
" 34. " *T. diflava;* lateral aspect; *9 t.* ninth tergite; *9 pl.* ninth pleurite; *9 s.* ninth sternite.
" 35. " *Tipula arctica;* ninth tergite, dorsal aspect.
" 36. " *T. hewitti;* the same.
Fig. 37. Hypopygium of *T. arctica;* inner pleural appendage.
" 38. " *T. subpolaris;* ninth tergite, dorsal aspect.
" 39. " *T. besselsoides;* the same.
" 40. Ovipositor of *T. arctica;* female sternal valves.
" 41. Hypopygium of *T. subarctica;* ninth tergite, dorsal apsect.
" 42. " *T. besselsoides;* inner pleural appendage.
" 43. Ovipositor of *T. arctica;* dorsal aspect.

EXPLANATION OF PLATE IV.

Fig. 44. Larva of *Pœcilostola*, supposition; spiracular disk.
" 45. " *Tipula arctica;* the same.
" 46. " *Stygeropis*, supposition; the same.
" 47. " *Tipuline* No. 2; dorsal aspect of entire larva.
" 48. " *Tipuline* No. 2; spiracular disk.
" 49. " *Tipuline* No. 3; the same.

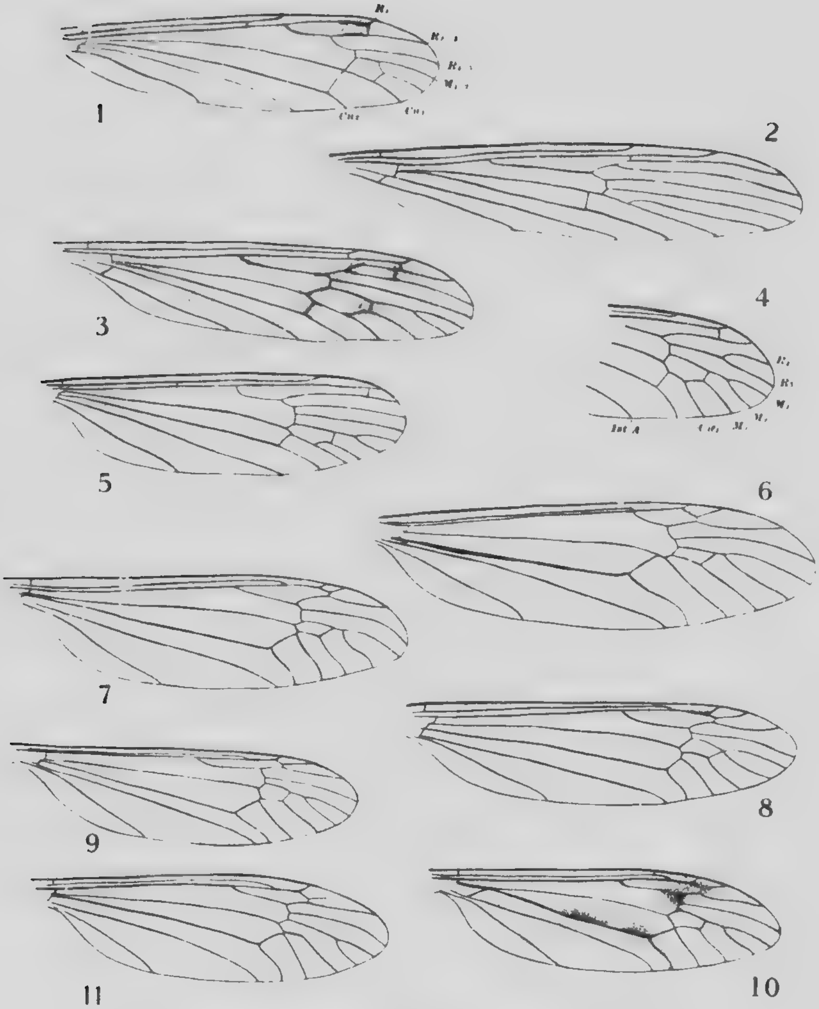
EXPLANATION OF PLATE V.

Fig. 50. Pupa of *Tipula arctica;* male, lateral aspect.
" 51. " *T. arctica;* female, dorsal aspect.
" 52. Larva of *Tipula arctica;* labrum, dorsal aspect.
" 53. " *T arctica;* mentum, ventral aspect.
" 54. " *Poecilostola*, supp.; outer lobe of maxilla.
" 55. " *Poecilostola*, supp.; mandible.
" 56. " *Tipula arctica;* chætotaxy of third abdominal tergite; dorsal aspect.
" 57. " *T. arctica;* the same, third abdominal sternite; ventral.
" 58. " *Stygeropis*, supp.; the same, third abdominal tergite; dorsal.
" 59. " *Stygeropis*, supp.; the same, third abdominal sternite; ventral.
" 60. " *Tipuline* No. 1; the same, third tergite; dorsal.
" 61. " *Tipuline* No. 1; the same, third sternite; ventral.
" 62. " *Tipuline* No. 2; the same, third tergite; dorsal.
" 63. " *Tipuline* No. 2; the same, third sternite; ventral.
" 64. " *Tipuline* No. 3; the same, third tergite; dorsal.
" 65. " *Tipuline* No. 3; the same, third sternite; ventral.

EXPLANATION OF PLATE VI.

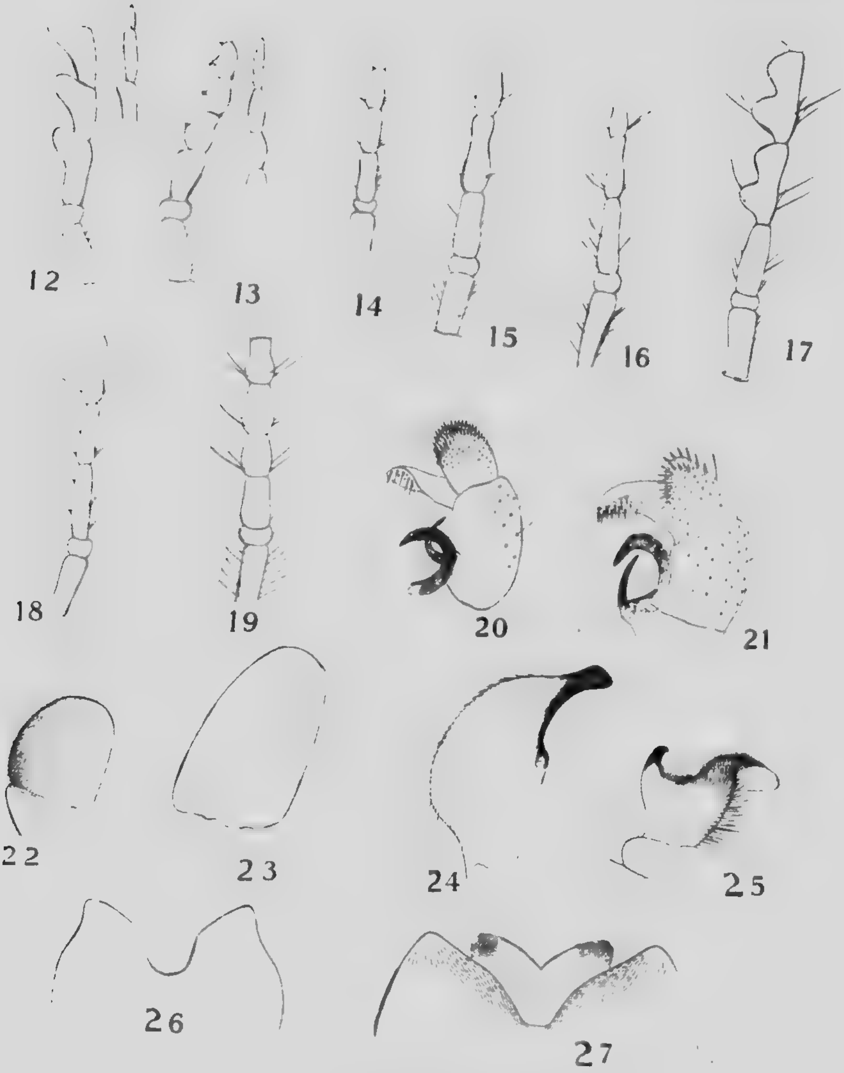
Figs. 1, 2. Female of *Tipula arctica* Curtis (Photos. by Geo. H. Wilkins)

PLATE I.



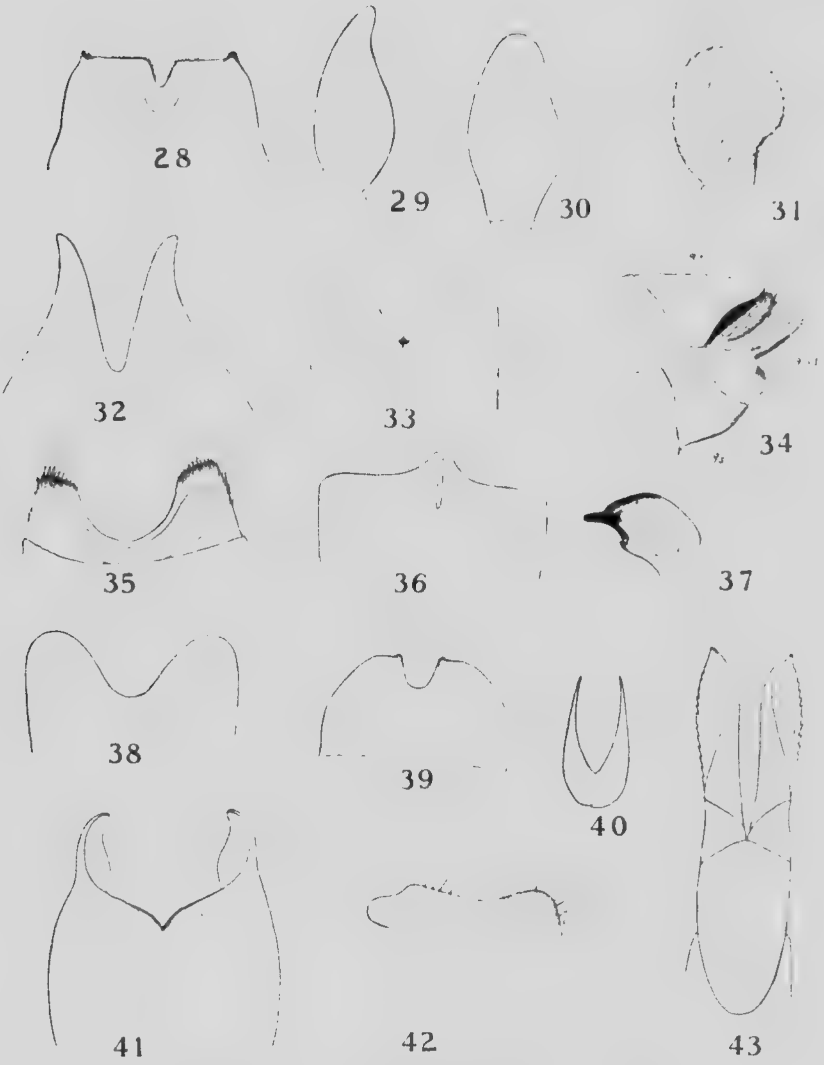
Crane-flies of the Canadian Arctic Expedition, 1913-16.

PLATE II.



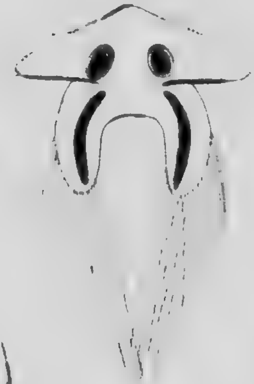
Crane-flies of the Canadian Arctic Expedition, 1913-16.

PLATE III.



Crane-flies of the Canadian Arctic Expedition, 1913-16.

PLATE IV.



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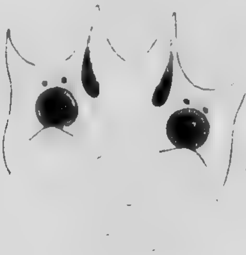

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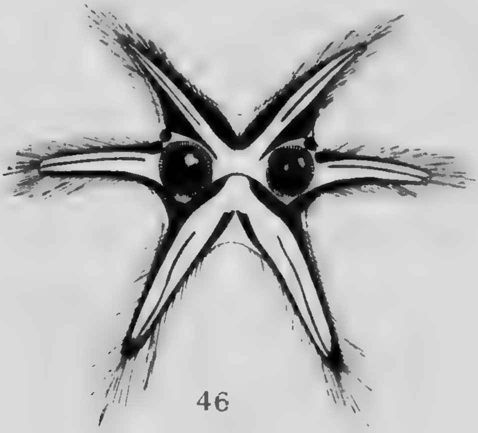

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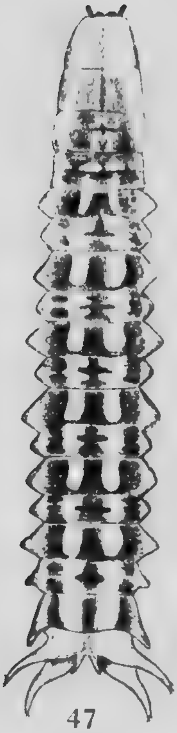

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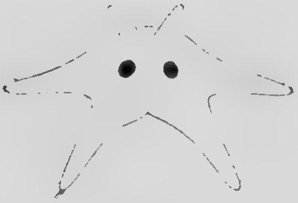

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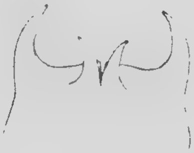

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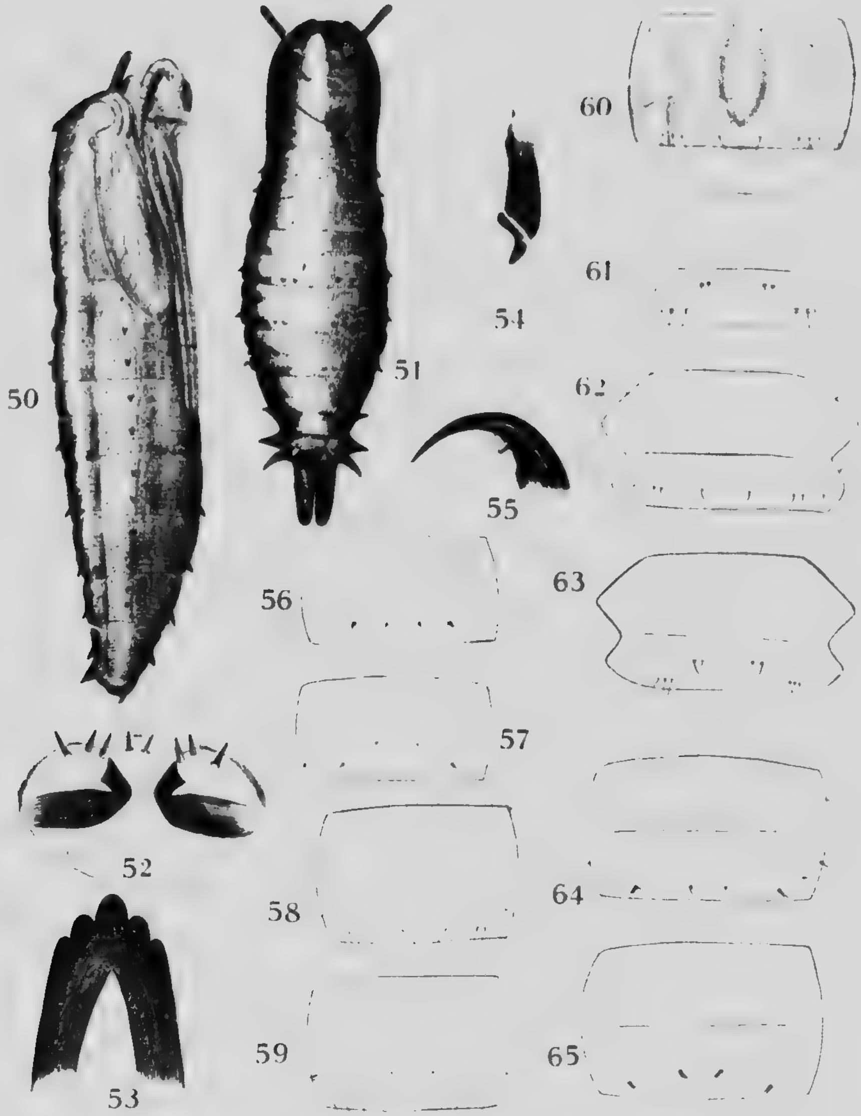
Crane-flies of the Canadian Arctic Expedition, 1913-16.

PLATE V.



Crane-flies of the Canadian Arctic Expedition, 1913-16.

Plate VI.

Tipula arctica Curtis   Photograph by G. H. Wilkins.

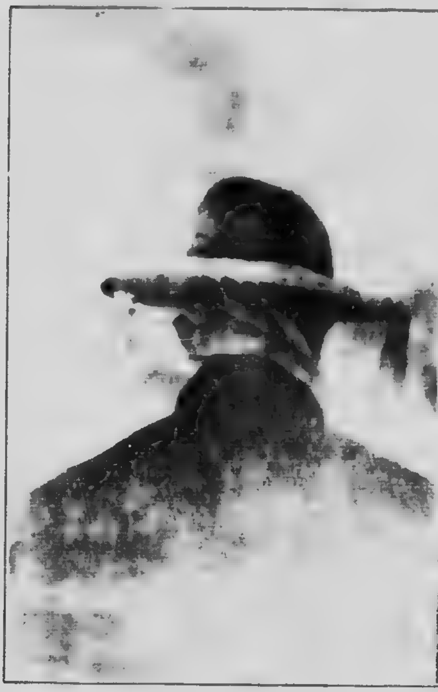
The Mosquitoes collected by the Canadian Arctic Expedition, 1913-18.

(Diptera, Culicidæ.)

By Harrison G. Dyar.

Introduction.

Many stories are current about the extraordinary abundance of mosquitoes in the Arctic regions, rivalling the tropics in this respect. That these stories are not overdrawn, is shown by the accompanying photographs, taken in the deltas of the Colville and Slave rivers by Dr. R. M. Anderson of the Canadian Arctic Expedition. Nevertheless, the number of species present is small in the northern regions, though individuals may be abundant. Along the Arctic coast of the Northwest Territories, here considered, but two species are identified, whereas a collection of an equal number of specimens in the tropics might include thirty or forty species.



Head net, as used in the North for protection against mosquitoes. Delta of Slave River, Great Slave lake, N.W.T., June, 1908.

Mosquitoes on back of man's hooded coat. Near Nigalik, delta of Colville river. Arctic coast of Alaska. July 3, 1909

The collection before me was made during the years 1913, 1914, 1915, and 1916; but it is disappointingly a small one (134 specimens), and the material is in very poor condition. The region, however, is interesting, embracing the Arctic coast of Alaska and the Canadian Northwest Territories.

Aë[illegible] (Ochlerotatus) nearcticus, n. sp.

FEMALE.—Pro[illegible]s long; palpi one-fifth the length of proboscis; setæ long and abund[illegible] head, thorax, coxæ, femora, and abdomen, black, becoming whitish in o[illegible] specimens. Mesonotum with coarse, narrow, curved, dark bronzy brown scales. Abdomen with broad basal segmental dull whitish bands; venter wholly grey-scaled. Integument entirely black. Wing-scales black, some white ones along the costa, subcostal, and first veins. rather numerous toward base.

MALE.—Similar to the female, with the usual sexual differences. Palpi about as long as the proboscis, the last joint slightly thickened; end of long joint and last two joints hairy. Antennæ weakly plumose. The genitalia have the side pieces conical, about three times as long as wide; apical lobe small, conical, nearly bare; basal lobe conical, with long setæ on its lower side, shorter ones without, the margin sometimes seen as a crenulate tuberculous line running upward obliquely from the lobe. Harpes narrow, chitinized on the margins, the tips pointed in a blunt tooth. Harpagones with curved columnar stems, thickened at the basal half, hirsute, with two setæ at the base, the outer part smooth; filament sickle-shaped, widened smoothly at base, the wide part tapering to the middle of the filament. Unci forming a pair of hooks similar to the harpes, but smaller. Basal appendages very small, with stiff spines.

Types and Locality: Bernard harbour, Northwest Territories, July 9, 1915 (Frits Johansen), Canadian Arctic Expedition, No. 1395; ♂, with the same data, No. 1391. According to the notes of the collector, these were bred from pupæ found in a pond (Rearing 59 A). Larvæ were collected June 18, 1915, and adults emerged July 14-23. (Rearing 59).

Also eighty-four specimens from the same locality, bred June 21-July 1, 1916 (Rearings 109, 121), and caught, the latter all ♀♀. Apparently the same species from the following localities: 8 ♀♀, West of Bernard harbour, Dolphin and Union strait, Northwest Territories, July 14, 1916 (F.J.); one ♀, Young point, Northwest Territories, July 18, 1916 (F.J.); 3 ♀♀, Herschel island, Yukon Territory, July 29, 1916 (F.J.); 6 ♀♀, cape Bathurst, Northwest Territories, July 26, 1916 (F.J.); 1[illegible] ♀♀, Konganevik, Camden bay, Alaska, July 4, 1914 (F.J.); 1 ♀, Cockburn point, Dolphin and Union strait, Northwest Territories, September 5, 1914 (F.J.). Also bred July 22, 1914, from larvæ collected at Collinson Point, Alaska, June 23, 1914, (Rearing 21).

The species is allied to *A. innuitus* Dyar and Knab, of Greenland; but the male genitalia differ in the shape of the harpes and the filaments of the harpagones. Also allied to *nigripes* Zetterstedt from Lapland, for a discussion of which see Dyar and Knab, Ins. Ins. Mens., v, 167, 1917.

LARVA.—Head rounded, wider than long; antennæ small, uniform, with sparse spicules, the tuft situated near the middle, composed of three short hairs. Head hairs single, at least the lower pair are so, the upper pair are broken in all the specimens; ante-antennal tuft in fours. Body with the skin glabrous; tracheæ thick and uniform, narrowing only in the end of the airtube, where there is a short closing apparatus. Air-tube short, about two and a half times as long as the basal width, tapering outwardly; pecten of 11 to 16 teeth, usually about 14, the single tooth finely pointed and with a rounded branch, followed closely by a three- to four-haired tuft. Lateral comb of the eighth segment of ten to fourteen scales in a patch, the single scale elongate conical from an oval base, with long central thorn and few small lateral spinules. Anal segment with a dorsal plate reaching to about the middle of the side, its edge even but bulging a little posteriorly; barred area preceded by one or two hair tufts, the area situated posteriorly; dorsal hairs a long hair and three-haired tuft on each side.

Locality: Specimens taken from a pond, Bernard harbour, Northwest Territories, June 28, 1915 (Frits Johansen), not isolated, but present in dominating numbers, so that they doubtless belong to the abundant species, *nearcticus*.

Aedes, n. sp.

(*Ochlerotatus.*)

A few larvæ collected with *Aëdes nearcticus* Dyar at Bernard harbour, Northwest Territories, represent an apparently undescribed form, but as there is no way of associating an adult, a name is not proposed.

Head hairs single; ante-antennal tuft in two; antennæ long, slender, a two-haired tuft at the middle. Skin glabrous. Lateral comb of the eighth segment of fifteen scales in a narrow patch; single scale with long terminal thorn. Air tube about three times as long as wide, tapered on the outer half; pecten reaching beyond the middle, the last three teeth detached; hair tuft in four, situated within the last tooth. Anal segment ringed by the plate, the brush posteriorly directed; anal gills four, tapered, rather short.

Aedes (**Ochlerotatus**) sp.

A dozen females from Seward peninsula, Alaska, of an *Aëdes* with dark-brown scales over the mesonotum, the pile apparently less abundant than in *A. nearcticus.* No advantage would be gained by attempting to apply a name to this form, which must await the collection of males or at least more perfect specimens.

Locality: Three ♀♀, Teller, Alaska, July 29, 1913 (Frits Johansen); nine ♀♀, Nome, Alaska, August 24-25, 1916 (F.J.), Canadian Arctic Expedition.

The Diptera collected by the Canadian Expedition, 1913-1918.

(Excluding the Tipulidæ and Culicidæ.)

By J. R. MALLOCH.

INTRODUCTION.

This paper deals with the Diptera collected by the Canadian Arctic Expedition 1913-16, and belonging to the following families: Sciaridæ, Chironomidæ, Simuliidæ, Leptidæ, Empididæ, Dolichopodidæ, Phoridæ, Borboridæ, Syrphidæ, Oestridæ, Tachinidæ, Calliphoridæ. Anthomyiidæ, Scatophagidæ, Helomyzidæ, Piophilidæ, Ephydridæ, and Chloropidæ. The number of species in the paper is ninety-three, representing fifty-five genera.[1]

Some of the genera and species included in this list are new to science, but others are recorded for the first time from Arctic America, having been previously known from the Arctic regions of the Old World. It is probable that many of the forms are circumpolar in their distribution, but the difficulties attendant upon their collection in the latitudes where they occur make it almost impossible to obtain representative collections from many regions.

Collections of Diptera from the far north present characteristics that are unmistakable to the eye of one who has previously studied material in other Arctic collections, since in both the remarkably uniform dull colours and in the genera comprising such collections they differ very strikingly from those of temperate regions. The predominating body-colour is a deep black, relieved occasionally with blue-black species such as the flesh-flies, and as a general rule the flies are hairy or bristly. Most of the forms are scavengers, living on decaying animal or vegetable matter, but a few are parasitic or predaceous. The phytophagous forms are rare, and from the far north no Trypetidæ are recorded, the most northern locality for that family being the Pribilof islands.

The work upon this collection was undertaken with the consent of Dr. Stephen A. Forbes, Chief of the Division of Natural History Survey of Illinois.

SCIARIDÆ.

The larvæ of this family live in decaying vegetable matter, sometimes in fungi, and occasionally in vegetation that has been attacked by other larvæ.

There are three species in this collection, none of which it is possible to identify specifically on account of their being represented only by females, and also owing to their defective condition.

Sciara, sp. 1.

This species has a peculiar wing venation which will enable some future student to associate the specimen with others that may be subsequently obtained.

The first vein ends in the costa midway between the cross-vein and the furcation of media, the latter originates about twice the distance of cross-vein proximad of the latter, runs very close to the upper branch of cubitus to the fork, the anterior branch then runs abruptly forward (towards costa) at almost a right angle to lower branch, curves round when about one-third of the distance to radius and runs to apex of wing, the cell it encloses being narrowed apically.

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[1] *Types.* The types of the new species described in this report are deposited in the National Collection of Insects, Ottawa.

The radial vein is setose. Costa extends almost to apex of upper fork of media. The posterior branch of media runs nearly straight from fork to wing margin.

Length, 3 mm.

Locality: Teller, Alaska, August 3, 1913 (F. Johansen).

Sciara, sp. 2.

Two females in poor condition. These differ from the preceding species in having the first vein ending in costa slightly before furcation of media, the latter originating midway from cross-vein to base of radius, and gradually diverging from anterior branch of cubitus, the cell between the anterior branch and radius, and narrowed basally.

Length, 2·75 mm.

Locality: Bernard harbour, Dolphin and Union strait, Northwest Territories, August 22, 1915 (F. Johansen).

Sciara, sp. 3.

This species differ from the preceding one in having the first vein ending in costa a little over midway from cross-vein to fork of media, the latter originating one-third of the distance from cross-vein to base of wing and the third branch of radius ending closer to apex of wing, nearly in vertical line with apex of posterior branch of cubitus.

Length, 3 mm.

Locality: Nome, Alaska, August 21, 1916 (F. Johansen). One female.

CHIRONOMIDÆ.

There are a number of specimens, representing several species, in the collection, but their condition is very bad so that specific identification is not possible except in a few cases. A number of larvæ and pupæ in alcohol lend themselves more readily to description and to generic classification than do the imagines, but so little is known of the immature stages of the many species occurring in the Arctic regions that it is impossible to give specific identifications for the specimens in this collection.

TANYPINÆ.

There are two species of this subfamily in the collection, neither of which is in very good condition. They apparently represent distinct genera.

Tanypus Meigen.

There is one species of this genus in the collection, some specimens of which are in sufficiently good condition to assure their identification.

The larvæ of this genus are met with in both swiftly flowing streams and in standing water, such as lakes and pools, or even in water-barrels or other temporary receptacles.

Tanypus alaskensis, n. sp.

MALE.—Black, subopaque. Legs fuscous. Wings slightly greyish; cross-vein infuscated, but not broadly so. Halteres brown. Plumes of antennæ and hairs of body and legs fuscous.

Palpi long, antepenultimate joint distinctly longer than penultimate, the latter longer than ultimate. Dorsum of thorax with numerous long hairs in the slightly sunk lines between the areas usually occupied by vittæ in other species, the same areas slightly grey pruinescent. Fore tarsi without conspicuously long hairs, basal joint three-fifths as long as fore tibia and twice as long as second joint; fourth tarsal joint on all legs distinctly longer than fifth. Wings narrow, costa extending well round apical curve of wing but falling considerably short of reaching apex.

Length, 6 mm.

Tanypus, sp. 1.

A pupa which may be that of the species described in this paper is very similar to that of *monilis* Meigen. It differs in having the thoracic respiratory organs more elongate, about 2·25 as long as thick, paler in colour, and with a short apical rounded projection. All the abdominal segments have a dark brown line at incisions, both on dorsum and venter; the lateral marginal hairs are very fine and number one or two on each segment near base, the seventh segment has three stronger hairs on each side and the eighth has five or six stronger flattened hairs; caudal fins pointed at apices, with four or five flattened hairs on basal half of outer margin and a slight protuberance at apex, giving each fin a sharply pointed appearance.

Length, 7 mm.

Locality: Inland lake at Bernard harbour, Dolphin and Union strait, Northwest Territories, August 10, 1915 (F. Johansen).

Along with this specimen there is one which evidently belongs to the species described as *Psilotanypus* sp. in this paper.

Psilotanypus, sp.?

Pupa.—Testaceous, with the thoracic markings of the enclosed imago showing through.

Head without tubercles between bases of antennæ. Thorax smooth, the respiratory organs like those of *Procladius concinnus* Loew, but comparatively broader (Pl. VII, figs. 10 and 11). Lateral margins of abdominal segments with narrow flat hairs, each side of eighth segment with 5-6 hairs which are regularly spaced; apical processes very similar to those of *Protenthes bellus* Loew, but broader and less rounded at apices (Pl. VII, fig. 5).

Length: 7-8 mm.

Imago.—Head yellowish testaceous, scape of antennæ fuscous, antennal plumes largely fuscous. Thorax testaceous; dorsum with a centrally divided median, and 2 broad, anteriorly interrupted lateral vittæ: scutellum black on base above; sternopleura entirely fuscous; mesopleura and metapleura including postnotum largely fuscous. Abdomen with each dorsal segment with a fuscous spot on each side posteriorly, the spots becoming progressively larger to apex of abdomen; segments 6, 7 and 8 each with a narrow fuscous band across base. Legs testaceous, the knees narrowly fuscous. Wings apparently with a dark area surrounding the cross-veins.

Fore tarsi similar to those of *occidentalis*, from middle of basal joint to apex of fourth with rather long hairs; mid and hind tibiæ and tarsi with moderately long hairs; fourth tarsal joint on all legs longer than fifth. Venation very difficult to make out, but the cross-vein like branch of radius between the first and third branches is not distinguishable, and the cubitus forks about midway from cross-vein to margin of wing; in *occidentalis*, the petiole of cubitus is very short.

Length, 7·5 mm.

Locality: From pond at Bernard harbour, Dolphin and Union strait, Northwest Territories, July 3, 1916 (F. Johansen).

CHIRONOMINÆ.

There are representatives of several genera of this subfamily in the collection, some of them represented by larval and pupal stages and some by imagines.

Diamesa Meigen.

This genus is represented in the collection by one species which does not agree in structure with any species known to me.

The larvæ of *Diamesa* species are generally found in fast running water and normally on rock surfaces. I have seen females that were collected while in the act of ovipositing in water caused by the melting of snow on mountains in Montana.

Diamesa arctica, n. sp.

FEMALE.—Black, subopaque. Wings subfuscous, veins thick and dark, cross-vein infuscated. Halteres brown.

Eyes very widely separated, width of frons equal to one-half the width of head; antennæ with 8 joints, the apical one four times as long as preapical, surface hairs long and rather numerous. Pronotum with a deep, moderately wide central, wedge-shaped incision; dorsum of mesonotum and scutellum with rather long fuscous hairs. Abdomen stout, with shaggy fuscous hairs. Legs stouter than in *Waltlii* Meigen, and with much more conspicuous hairs; fore tarsi with the basal joint very little more than one-half as long as fore tibia; fourth tarsal joint on all legs sub-equal to or very little shorter than fifth; mid tarsi with a series of minute erect setulae on ventral surface of at least the basal two joints. Venation similar to that of *Waltlii*.

Length, 4·5 mm.

Type locality: Colville mountains, Wollaston peninsula, Victoria island, July 22, 1915 (D. Jenness). Paratype, lake Angmaloktok, Colville mountains, Wollaston peninsula, Victoria Island, July 29, 1915 (D. Jenness).

Chironomus.

Th[illegible]rvæ and pupæ of one species and one imago of possibly another species of this genus in collection.

Chironomus, sp. 1.

A male in rather poor condition resembles closely several species I have described from Pribilof islands. It is entirely black and has the fore tarsi long-haired, characters common to nearly all males of this genus I have seen from the far north. Structurally the specimen agrees very well with one I have described as *conformis* in a paper now in press, but more specimens are necessary to ensure an authentic identification.

Length, 7 [illegible]m.

Locality: Baxter island, Arctic coast of Alaska, July 2, 1914 (D. Jenness).

Chironomus, sp. 2.

LARVA.—Bright red in life. Labium very similar to that of *tentans* Fabricius, but the median tooth is regularly rounded and the small submedian one larger than in that species; the mandible has three teeth in addition to the large apical one. The ventral and respiratory filaments are absent, the dorsal papillæ are small, each with eight long hairs, and the four apical respiratory protuberances between the caudal pseudopods are about three times as long as thick.

Length, 17–19 mm.

Pupa. Similar to that of *tentans.* The second abdominal segment has a transverse line of minute chitinized spinules on posterior margin, and almost the entire dorsal surface covered with small brown scale-like elevations, which are most conspicuous posteriorly; a rather long hair is present on each side of median line posteriorly, and the elevations are absent round the bases of those as well as on a number of small round areas on anterior half of disc; segments 3 to 5 without transverse line posteriorly, but in other respects as second, though the elevations, or scales, become progressively weaker to fifth segment and are present only near posterior margin on sixth and seventh as two small brown patches; eighth segment with each postero-lateral angle armed with a chitinized process similar to that of *decorus* Johannsen.

Length, 14 mm.

Locality: Pool at Collinson point, Alaska, June 22, 1914 (F. Johansen).

Chironomus, sp. 3.

Larva. This species differs from the previous one only in being smaller, 11 mm., and in having a dark brownish vitta on dorsum of head, and the submedian labial tooth attached to median one so that it appears more like a protuberance from the side of the latter than a distinct tooth.

Locality: Brackish pond, Bernard harbour, Dolphin and Union strait, Northwest Territories, August 4, 1915 (F. Johansen)

Tanytarsus Van der Wulp.

There are several imagines and some larvæ of this genus in the collection.

Tanytarsus, sp. 1.

Five males in poor condition resemble in most particulars *viridiventris* Malloch. The thorax is black, abdomen fuscous, though probably greenish in life, and legs pale fulvous. The fore tarsi have no long hairs and the basal joint is about 1·5 as long as second. The wings are not in good enough condition to give an accurate idea of the venation.

Length, 3·5 mm.

Locality: Teller, Alaska, August 3, 1913 (F. Johansen).

Tanytarsus, sp. 2.

One male without fore tarsi. Larger than foregoing. Entirely black, including the legs, halteres, and antennal plumes. Wings with very short surface hairs; radius extending to beginning of apical curve of wing; cross-vein slightly before middle.

Length, 4·5 mm.

Locality: Lake Angmaloktok, Colville mountains, Wollaston peninsula, Victoria island, July 22, 1915 (D. Jenness).

Tanytarsus, sp. 3.

Larva. Orange in life; alcoholic specimens, greenish yellow, head brown.

Base of antennæ pedunculate; basal antennal joint about five times as long as thick, second joint about one-fourth as long as basal, third and fourth joints pale, their combined lengths not equal to length of second and distinctly less than that of the long pair of filaments at apex of second joint, the filament at apex of basal joint not longer than second joint; mandibles stout, with a rather strong, and not very sharp apical tooth, and three small teeth along inner margin;

labium with nine distinct teeth, all of which are rounded at apices, the central one much broader than the first lateral and slightly shorter; surface of the head with the usual hairs. Dorsum of each thoracic segment with four to six long hairs; thoracic pseudopods stout, armed at apices with weak, pale hairs. Dorsal apical papillæ very slightly elevated, each armed with six dark brown hairs; four short, stout, respiratory protuberances caudad of dorsal papillæ and between anal pseudopods, the latter stout and short, the apical armature consisting of rather stout pale thorns.

Length, 8–9 mm.

Locality: Brackish pond at Bernard harbour, Dolphin and Union strait, Northwest Territories, June 6, 1916 (F. Johansen).

Along with this species is one of *Orthocladius* sp. 2. There are no well-defined larval cases in the vial with the larvæ, and only one rude cylindrical "runway" similar to those of *Chironomus* species.

Tanytarsus, sp. 4.

This species is much smaller than the preceding, being about 5 6 mm. in length, and forms a cylindrical case which is very little longer than the larva and is entirely covered with fine particles of sand. There are no filament-like protuberances on the cases before me such as are on cases of some members of this genus found in streams in the more temperate portions of this continent.

Structurally the larva resembles the preceding species, but the labium is not so straight on its anterior outline laterally, being more like that of *Orthocladius nivoriundus* Fitch, the central portion being almost transverse, with broad, poorly defined teeth, and the lateral portions sloping backward, with sharp teeth. The antennæ are almost as in the preceding species.

Locality: Bernard harbour, Dolphin and Union strait, Northwest Territories, from bottom of big lake (20 feet), middle of February, 1916 (F. Johansen). Another vial with date December, 1915, station 42*v*, contains a large number of these larvæ.

Camptocladius Van der Wulp.

Four specimens in the collection appear to belong to this genus. They are all males, but their condition is too poor to enable me to make certain of even their generic status. They, however, have the habitus of *Camptocladius* and probably belong here.

Length, 2·5 mm.

Locality: Bernard harbour, Dolphin and Union strait, Northwest Territories, June 18, 1915 (F. Johansen).

Orthocladius Van der Wulp.

This genus is well represented in northern latitudes; the species occur in the United States very early in the year, March and April being the months in which they are most abundant.

There is one imago of a species in this collection and the larvæ of one which may or may not be the same species.

Orthocladius, sp. 1.

A male in poor condition closely resembles *nivoriundus* Fitch, but the fore tarsi have much longer hairs, the basal fore tarsal joint is slightly less than three-fifths as long as fore tibia, the wings are milky, and the cross-vein is oblique.

Length, 6 mm.

Locality: Collinson point, Alaska, June 22–23, 1914 (F. Johansen).

This may be the species recorded as *pubitarsis* Zetterstedt, from Greenland, by Lundbeck, but so many of the northern species of *Orthocladius* and *Chironomus* have the same habitus and general characters of colour and hairing of the fore tarsi that it is not possible to say definitely whether Zetterstedt's species occurs there or not without a careful comparison of a series of specimens of species from Europe and Greenland.

Orthocladius, sp. 2.

A species represented by a number of specimens to which I have given this name may not belong to *Orthocladius* in the restricted sense, but is related to that genus.

The colour of the larva in life is greenish or yellowish. In general form the body resembles that of *Campocladius*, tapering to the apex and being without dorsal papillæ and permanently protruded blood-gills. The head is small, tapered anteriorly, about as long as its greatest width, with very minute, unprotruded antennæ, and well developed, distinctly toothed mandibles. The labial plate is armed with about eight rounded teeth, the anterior four being in an almost transverse line. Thoracic pseudopods very small, armed with a few black hairs at apices. Anal pseudopods at extreme apex of last segment, even smaller than the thoracic pair, armed with a few black hairs and some curved thorns at apex. Body without surface hairs.

Length, 3·5–4·5 mm.

Locality: Demarcation point, Alaska, May 16, 1914, in mud of freshwater ponds (F. Johansen).

Genus incertus.

A larva and pupa from the stomach of the Great Lake-trout (*Cristivomer namaycush*) belong to a genus unknown to me. It is my opinion that the genus belongs to Tanypinæ, but so little is known of the immature stages of the aberrant genera of Chironominæ that I cannot be absolutely certain of the relationship of the rather imperfect specimens before me.

LARVA. Testaceous; posterior margin of head, apices of mandibles, and lateral portions of labium dark brown.

Head with sparse, long, erect pale hairs; antennæ either retracted or missing; mandibles very long, apex terminating in a long, slender, sharp tooth, inner margin with three widely spaced, short, truncated teeth; maxillary palpus short, not over 1·5 as long as thick; labium without distinct teeth, minutely irregularly serrated anteriorly, its anterior outline produced anteriorly in centre; hypopharynx with eight to ten small teeth on each side above lateral dark areas of labium; ventral surface of head with a narrow pale central stripe, bordered on each side with blackish brown. Anterior pseudopods short and stout, armed apically with many stiff hairs; body without noticeable hairs; anal pseudopods stout, with apical retractile claws; dorsal papillæ about three times as long as thick, each with about six apical hairs; two apical respiratory protuberances at base of pseudopods dorsally, their length about three times their width, apices sharp.

Length, 15 mm.

PUPA. Testaceous. Head missing. Prothoracic respiratory organs not elevated (possibly missing); wings extending to middle of second abdominal segment; none of the tarsi exceeding apices of wings, the fore and hind legs with the tibiæ and tarsi straight, the mid pair with the tibiæ and tarsi forming a double curve. Incisions between abdominal segments marked by a dark brown line on dorsum and venter; each segment except first and last with three long, slightly flattened hairs on each side; penultimate segment with two large downwardly projecting, posteriorly flattened, projections on posterior margin, which are separated by a distance about equal to their own width; apical segment flattened on dorsum, laterally sloping ventrad and mesad, armed along the basal two-thirds of its lateral margins with slender, slightly flattened hairs, and with four long, flat hairs on apical third, venter of apical segment with a large bifid protuberance.

Length, 13 mm.

Locality: Lake at Bernard harbour, Northwest Territories, June 26, 1915 (F. Johansen).

In the vial with the specimens is a large sack-shaped cocoon or pocket of a very tough consistency which may belong to this species. It is open at one end and shaped somewhat like the cocoon of *Simulium* except that it does not taper so much at bottom. The surface is coated in part with small pieces of rotten wood.

SIMULIIDÆ.

There are several lots of larvæ, pupæ, and imagines of this family in the collection. The imagines, with few exceptions, are in very poor condition.

The larva and pupa of one species, obtained at Bernard harbour, very closely resemble those of *Simulium vittatum* Zetterstedt, but as is shown in the text following it is specificially distinct.

The larvæ of this family are found only in running water, some species preferring very swift streams with rocky beds, and particularly those parts of the streams where there are falls or declivitous rock-surfaces over which the water moves at an accelerated speed. Other species are found in streams with only a moderate current, and since in these streams the bed is generally more or less muddy and gives an opportunity for a weedy or grassy growth, the larvæ and cocoons are usually found attached to this growth or to roots or fallen branches of trees in the stream.

The imagines are predaceous, usually feeding upon the blood of mammals, and are a great pest in certain parts of North America and Europe. As a general rule the flies do not bite man, but they cause great discomfort by flying precipitately against the face, and by getting into the hair. Their bite is more painful than that of a mosquito.

There are imaginal representatives of two genera and three species in the collection.

Prosimulium Roubaud.

The only species of this genus in the collection is apparently undescribed.

Prosimulium borealis, n. sp.

MALE. Black, opaque. Thorax and abdomen with yellowish white hair. Wings clear. Halteres brown.

Head as in *hirtipes* Fries, the antennæ rather slender, postocular cilia dark. Thorax with long, but not very dense, subdepressed hairs, those on posterior margin and scutellum longer than those on disc; mesopleura with a few long hairs near upper margin. Fore tarsus with basal joint slender, not so thick but 1·5 as long as basal joint of mid tarsus; basal joint of hind tarsus almost as thick as hind tibia, and nearly four times as long as second, not produced at apex; second joint thickest a short distance before apex, three times as long as its greatest diameter, and twice as long as third. Venation similar to that of *pecuarum* Riley, the radial vein with third branch thickened at apex but not distinctly furcate.

Length, 3 mm.

Type locality: Wollaston peninsula, Victoria island, summer, 1915 (D. Jenness).

This species resembles *pleurale* Malloch in having the mesopleura hairy on the supper portion. The third branch of radius in *pleurale* is very distinctly furcate, which is not the case in *borealis*.

A female which is in rather poor condition appears to belong to this species. In colour it is identical with the male, but it is not possible from the condition of the specimen to say whether the mesopleural hairs are present or not. The claws are bifid, as in *pleurale*, but the third branch of radius is as in the male of *borealis*. The basal joint of the hind tarsus is of equal thickness throughout its length, its apex is not produced on posterior side, and its length equals 2·5 the length of second.

Locality: Bernard harbour, Northwest Territories, August 25, 1916 (F. Johansen).

Simulium Latreille.

There are imagines of two species of this genus in the collection. It is not possible to definitely associate the larval and pupal material in the collection with the adults as no specimens were reared. It is highly probable that the pupæ I describe in the following pages belong to species represented in the adult forms, but there appear to be three distinct species in the former and only two in the latter. Unless the species which has sixteen-branched respiratory organs is that of *Prosimulium borealis*, which does not appear probable from what I know of the pupæ of that genus, there must be a third species that occurs Bernard harbour.

Simulium, sp. 1.

This species closely resembles *venustum* Say in colour, but is larger than the average for that species, being nearly 3 mm. in length. The specimen is in such poor condition that it is impossible to tell whether the scutum is marked or not. The abdomen has the characteristic colouring of the *venustum* group, the basal four segments being opaque black and the apical five shining black dorsally. The legs are black, with the fore coxæ, trochanters, bases of all femora (narrowly), basal half of all tibiæ, basal two-thirds of hind metatarsus, and basal half of second joint of hind tarsus pale yellow. Mid tarsi missing. Wings clear. Halteres yellow.

It is impossible to say anything about the structure of the tarsal claws as the only pair that are left are stuck fast in the mounting medium, and are not visible to the extent of showing if they are simple or not.

Locality: Hood river, Arctic sound, Northwest Territories, August 28, 1915 (R. M. Anderson).

Simulium similis, n. sp.

FEMALE.—Similar to *arcticum* Malloch in general coloration and in structure of tarsal claws.

Black, subopaque, covered with whitish pruinescence. Antennæ, palpi, and proboscis entirely black; front and face with dense whitish pruinescence, the former very faintly shining; hairs of face and frons whitish yellow, those on vertex and upper part of occiput partly brown. Dorsum of thorax, when seen from the front, with an indistinct, broad, whitish pruinose vitta on each side of median line, when viewed from behind with the vittæ less distinctly whitish than the area behind each anterior lateral angle; pile of dorsum all hair-like, rather short and depressed; no erect dark hairs distinguishable. Abdomen with basal four segments opaque; the apical five segments very faintly shining; surface hairs all yellowish. Legs black, basal two-thirds of fore tibiæ dorsally, basal third of mid and hind tibiæ, basal third or basal joint of mid tarsi, basal two-thirds of basal and basal third of second joint of hind tarsi yellowish. The tarsal claws are similar to those of *arcticum* Malloch, but besides the differences in colour evident from the above description there are no long erect dark hairs on thoracic dorsum as in that species.

Length, 2·3 mm.

Type locality: Hood river, Arctic sound, Northwest Territories, August 28, 1915 (R. M. Anderson). Paratypes, Bathurst inlet, Northwest Territories, September 1, 1915 (R. M. Anderson).

This species is closely related to *arcticum* Malloch, described from British Columbia, but the points mentioned in the description should serve to separate the species.

Simulium, sp. 2.

PUPA.—This species is similar to *johannseni* Hart in having the thoracic respiratory organs each four-branched (Pl. VI, fig. 4). There is also a European species with this characteristic. From *johannseni* the present species differs in the armature of the abdomen. The third and fourth dorsal segments each have eight stout anteriorly directed thorns near the posterior margin, in a transverse series, four on each side, the space between each series of four about three times as wide as the space between the thorns of each series; dorsal segments five to eight inclusive, each with a transverse series of weak, backwardly directed spines near anterior margin, the series of fifth segment much shorter than that on sixth, those on other segments becoming progressively longer and stronger as they near apex; apical segment with two short spines; fourth, fifth, and sixth ventral segments each with two short spines on each side.

Length, 3 mm.

Locality: Bernard harbour, Dolphin and Union strait, Northwest Territories, August 16, 1915, in bed of river (F. Johansen).

Simulium, sp. 3.

PUPA.—Differs from the foregoing in having the thoracic respiratory organ each with twelve or thirteen branches (Pl. VI, fig. 13) and the armature of the abdomen as follows. Third and fourth dorsal segments each with eight very small recurved thorns arranged as in the previous species, fifth segment with the anterior transverse armature almost imperceptible, that on sixth, seventh, and eighth consisting of a series of very small, closely placed spinules that extends entirely across the surface from side to side; apical segment with two very conspicuous upwardly curved thorn-like processes, fifth ventral segment with a pair of small thorns on each side near posterior margin, sixth and seventh each with one such thorn similarly located.

Length, 3·5 mm.

Locality: Bernard harbour, Dolphin and Union strait, Northwest Territories, July 10, 1916 (F. Johansen).

Simulium, sp. 4.

PUPA.—Differs from the previous species in having sixteen-branched thoracic respiratory organs (Pl. VI, fig. 12). The abdominal armature is as follows: second dorsal segment with eight minute spines on each side—three in a submedian transverse group, three in a sublateral similarly disposed group, and two midway between these groups; third and fourth segments each with the same number of spines as second, but they are stronger, more appreciably recurved apically, and the submedian and intermediate series are not so distinctly separated and appear as a single rather irregular series of five thorns; fifth and sixth segments without well-developed spinules anteriorly; seventh and eighth each with a complete series of spinules near anterior margin; apical segment with two to three small spines on each side; third ventral segment with two thorns on each side, fourth with three, fifth with two, and sixth with one.

Length, 4·5 mm.

Locality: Bernard harbour, Dolphin and Union strait, Northwest Territories, August 16, 1915, in bed of river; same locality, July 10, 1916 (F. Johansen).

With this last lot there a number of larvæ of which I dissected the heads of two. In most respects these larvæ resemble the larva of *johannseni* Hart, but the anal respiratory gills are withdrawn in all the examples so that it is not possible to say what they are like structurally.

I have drawn some of the cephalic parts as a better index to their structure than a written description. One striking feature in the species is the very conspicuously darkened third antennal joint. In most species the antennæ are uniformly coloured. Structurally the larva is a true *Simulium* and very likely that of the last described pupa; both probably belong to *borealis* sp. n. For details of mandibles, labium, antennæ, and maxilla, see Pl. VII, figs. 7, 3, 2, and 1, respectively.

In all specimens of the pupæ of this species there are either fifteen or sixteen thoracic respiratory branches, usually with two or three much shorter than the others, and the arrangement differs noticeably from that in *vittatum* which always has the branches paired to near base and very regular in arrangement and length.

LEPTIDÆ.

There is one specimen of a species of *Ptiolina* in the collection. I have already described this species in a paper on the Diptera of Pribilof islands which is now in press.

Ptiolina arctica Malloch.

One [illegible], Bernard harbour, Dolphin and Union strait, Northwest Territories, July 13, [illegible], 1915 (F. Johansen).

EMPIDIDÆ.

This family is usually well represented in collections from northern latitudes and in the material before me there are over twenty specimens represent. six species of the genus *Rhamphomyia*.

The larvæ of the species which I have found in Illinois are predaceous, and live in earth and decaying wood or leaves. Some species are aquatic in the larval and pupal stages. The imagines of the genera *Empis*, *Rhamphyomyia*, and *Hilara* are met with in swarms similar to those of Chironomidæ and Culicidæ, performing a rhythmical aerial up and down flight generally in the lee of a bush or tree, but some species, especially of *Hilara*, fly over water, notably close to the surface of pools in streams. The imagines of most species are predaceous, and in some cases the males capture the prey, fly past a swarm of females with it, inducing females to pursue them, and in the process of transference of the prey to the female copulation takes place.

Rhamphomyia Meigen.

This, the only genus of the family in the present collection, is represented by six species and twenty-two specimens. I have experienced so much trouble in attempting to identify species of this genus through the lack of synopses in the papers I have used that I have drawn up a key to those dealt with in this paper in the hope that subsequent students may find it useful in identifying collections from this region. With one exception I have failed to associate the species before me with any previously described, and even in the case of the one I have identified I have a slight doubt as to the correctness of my identification because I have not the male before me, and it was from that sex that the species was originally described.

KEY TO SPECIES

MALES

1. Halteres black or black-brown 2
   Halteres yellow 4
2. Femora very distinctly thickened; eyes separated by width across posterior ocelli; sixth vein extending to margin of wing; hairs on thorax and abdomen thick . . . . . *erinacioides*, n. sp
   Femora not appreciably thickened, little stouter than tibiæ; eyes contiguous or subcontiguous; sixth vein not extending to wing margin; hairs on thorax and abdomen fine 3
3. Hind tarsi with the basal joint thicker than tibiæ at apices, and very much thicker than basal joint of fore and mid tarsi; all tibiæ and basal two joints of all tarsi with rather dense, long, fine hairs dorsally . . . . *ursina*, n. sp
   Tarsi not as above, legs without long dense hairs on tibiæ and basal two joints of all tarsi, several of the hairs on basal joint of tarsi on all legs conspicuously stronger than the others, bristle-like . . . . *simulata*, n. sp
4. Hairs of thorax and abdomen yellowish . . . . *albopilosa* Coquillett.
   Hairs on thorax and abdomen black . . . . *conservativa*, n. sp

FEMALES.

1. Halteres black 2
   Halteres yellow 4
2. Mid and hind femora with a series of squamulæ along the postero-ventral margins; basal joint of hind tarsi at least as thick as apices of tibiæ; sixth vein extending to margin of wing . . . . *herschelli*, *n. sp.*
   Femora devoid of squamulæ, at most with hairs or bristles; sixth vein not extending to margin of wing 3
3. Tibiæ and tarsi with dense short hairs of uniform strength, which nowhere exceed in length the diameter of the part upon which they are situated . . . . . *ursina*, n. sp
   Tibiæ and tarsi with sparse, stout bristles, many of which exceed in length the diameter of tibiæ or tarsi, those on dorsum of basal joint of tarsi very unequal in length . . . . . *simulata*, n. sp
4. Ventral plate between bases of fore coxæ with long pale hairs; hairs on thorax and abdomen yellowish . . . . *albopilosa* Coquillett?
   Ventral plate between bases of fore coxæ bare; hairs on thorax and abdomen black . . . . . *conservativa*, n. sp

Rhamphomyia erinacioides, n. sp.

MALE. Black, subopaque. Wings slightly brownish, veins dark brown. Halteres black-brown. Hairs on entire insect fuscous.

Eyes separated by as great a width as distance across posterior ocelli; antennæ with basal two joints subequal in length, third joint broad at base, tapered from near base to apex, its entire length slightly more than twice its greatest width and 1·5 as great as first and second combined; apical style thick, one-third as long as third joint; proboscis slender, tapered to apex, its entire length equal to 1·5 the height of head; palpi short; occiput with long, rather thick hairs. Dorsum of mesonotum covered with long, rather dense, upright, thick hairs; ventral prothoracic plate between fore coxæ bare, the portions of thorax immediately above bases of fore coxæ with long hairs; hairs in front of halteres numerous; scutellum with a closely set fringe of upright hairs along posterior margin (24 30). Abdomen with dense erect stout hairs on entire surface except on the hypopygium; hypopygium large, upper processes long, directed cephalad over dorsum, as shown in Pl. VII, fig. 6, the filament not visible except near base. Femora very noticeably thickened, tibiæ and tarsi more slender than usual; all femora with rather dense hairs, which are not so thick as those on abdomen, hind pair with the ventral surfaces devoid of long hairs except on basal third, beyond that with dense microscopic pile; all tibiæ with short hairs on dorsal surfaces and dense erect microscopic pile on ventral surfaces;

tarsi not noticeably bristly; claws very long and much curved. Discal cell closed, normal in size, vein closing lower portion of apex much curved; sixth vein faint, but traceable to margin.

Length, 5 mm.

Type locality: West of Kongenevik, Camden Bay, Alaska, July 4, 1914 (F. Johansen). Paratype, Barter island, Arctic coast of Alaska, July 11, 1914 (D. Jenness).

Rhamphomyia ursina, n. sp.

MALE. Black, slightly shining. Wings slightly brownish, veins black-brown. Halteres brown, knobs black. Hairs on entire insect fuscous.

Eyes contiguous; third antennal joint longer and narrower than in the preceding species; proboscis slender, slightly longer than height of head; palpi small; occiput with numerous slender hairs. Hairs on dorsum of mesonotum very fine, erect, and moderately dense; pleura and prothorax as in preceding species; scutellum with marginal fringe of long hairs (12-16). Abdominal hairs fine and short, moderately dense; hypopygium in type badly crushed, but in general structure similar to that of preceding species, differing essentially in having the two stout anteriorly directed processes covered with soft short hairs. Femora slender, barely stouter than tibiæ, fore and mid pairs with moderately long hairs, hind pair almost bare; all tibiæ and the basal two joints of all tarsi with dense, long, fine hairs dorsally; basal joint of fore tarsi slender, thinner than tibia and as long as joints two and three combined; basal joint of mid tarsi thicker and distinctly shorter than that of fore tarsi; basal joint of hind tarsi twice as thick as mid pair, and distinctly thicker near apex than hind tibiæ at apices. Discal cell normal, the vein closing it on lower portion at apex nearly straight; sixth vein not extending to margin.

Length, 4 mm.

Type locality: On sandy beach Bernard harbour, Dolphin and Union strait, Northwest Territories, July 19, 1915 (F. Johansen).

There are two females in the collection which probably belong to this species. One of them is in fair condition and is described herewith.

Identical in colour with the male.

Eyes separated by a space greater than distance across posterior ocelli; antennæ similar in structure to those of male of *erinacioides*. Thorax less densely hairy than in male, the scutellum with about eighteen to twenty bristly hairs. Abdomen pointed apically. Legs slender, tarsi not so much thickened as in the male, the basal joint of the hind pair equal to hind tibia in thickness; hairs on legs short, the longest ones not as long as diameter of tibia; no outstanding bristles on basal joints or tarsi. Venation as in male.

Localities: Sandy beach, Bernard harbour, Dolphin and Union strait, Northwest Territories, July 19, 1915; Bernard harbour, July, 1916 (F. Johansen).

Rhamphomyia similata, n. sp.

MALE.—Similar to the preceding species in colour.

Eyes closely contiguous for a considerable distance below ocelli; third antennal joint about four times as long as its basal width, style short, about equal in length to greatest width of third joint; proboscis nearly twice as long as height of head; occiput with long slender hairs. Dorsum of pronotum with dense, long, erect, slender hairs; pleura and prothorax as in preceding species; scutellum with ten to twelve long hairs on margin. Abdomen with rather sparse hairs, which are longer and more numerous on posterior margins of segments, hypopygium similar to that of *ursina*. Legs rather stout; all femora with short sparse hairs, those on apical half on antero-ventral surface of hind pair more dense and setulose; basal joint of hind tarsi thicker than that of other pairs; all tibiæ with numerous long hairs dorsally, which exceed in length the diameter of tibiæ, those on the anterior sides less numerous and bristle-like; basal joint of all tarsi with two or more of the hairs on dorsum conspicuously stronger than the others, ventral surfaces with numerous erect setulæ among the hairs. Venation similar to that of *ursina*.

FEMALE.—Agrees in colour with the male.

Eyes separated by about twice the distance across posterior ocelli; antennæ as in the male. Thorax less conspicuously hairy than in male, the dorsum slightly brown pruinescent, centrally indistinctly bivitate, between the vittæ with two-rowed acrostichals; scutellum with eight slender bristles. Abdomen pointed apically, the ovipositor very slender. Legs similar to those of male, except that the basal joint of hind tarsus is not as thick as tibia, and that the hairs are less numerous and more bristly, noticeably so on mid and hind tibiæ and tarsi. Venation as in male, the wings darker.

Length, 4-5 mm.

Type locality: Bernard harbour, Dolphin and Union strait, Northwest Territories, July 18, 1915 (F. Johansen).

A male in the collection lacking abdomen differs slightly from the type, and may belong to a different species.

Locality: Cockburn point, Dolphin and Union strait, Northwest Territories, Canadian Arctic coast, September 5, 1914 (F. Johansen).

Rhamphomyia herschelli, n. sp.

FEMALE. Black, shining. Wings slightly and evenly browned. Halteres black. Hairs throughout fuscous.

Eyes separated by distinctly more than twice the width across posterior ocelli; third antennal joint three times as long as its basal width; style one-third as long as third antennal joint; proboscis 1·5 as long as height of head, occiput with numerous hairs. Hairs on dorsum of mesonotum short, confined to anterior half of disc, acrostichals two-rowed; scutellum with about ten bristles. Abdomen pointed apically; ovipositor very slender. Legs rather stout, basal joint of fore and mid tarsi each as thick as tibiæ at apices; basal joint of hind tarsus thicker than hind tibia at apex; mid and hind femora with a series of squamulæ along the postero-ventral margin; tibial bristles very weak and sparse, none nearly equalling diameter of tibiæ. Vein closing lower portion of apex of discal cell very much curved; sixth vein extending to wing margin.

Length, 5-6 mm.

Type locality: Herschel island, Yukon Territory, July 29, 1916 (F. Johansen) Two specimens.

This may be the female of *erinaciodes*, but it does not agree with the male in such characters as the very slender tibiæ and tarsi as, from previous experience, I should judge it ought to do if it were the male of that species.

Rhamphomyia albopilosa Coquillett.

Rhamphomyia albopilosa Coquillett. Proc. Wash. Acad. Sci., vol. 2, 1900, p. 418

What I take to be this species is represented in the collection by two females. As the species was originally described from two males, taken at Berg bay, Alaska, the female is described herewith.

FEMALE.—Black, slightly shining, distinctly grey pruinescent, especially on pleura and abdomen. Wings slightly and uniformly brownish, veins dark brown. Halteres pale yellow. Hairs on thorax, abdomen, and coxæ and femora pale yellow, scutellar bristles, most of the hairs on occiput, and all of those on palpi and antennæ black; tibial and tarsal bristles and hairs black.

Eyes widely separated; third antennal joint conical, about 2·5 times as long as its basal width; style slightly over one-third as long as third antennal joint; proboscis fully twice as long as height of head. Hairs on thorax long and soft, the acrostichal series in two to three irregular rows; plate on venter between fore coxæ long-haired; scutellum with four bristles. Abdomen rather acutely pointed apically. Legs very slender; femora with very short surface hairs; fore tibiæ without differentiated bristles; mid and hind tibiæ with a few short bristles on dorsal surfaces which are not as long as the diameter of the tibiæ; tarsi slender, all joints with stiff black setulæ ventrally, and a few differentiated setulæ on dorsum of at least the basal joint. Wing venation normal; the vein closing lower portion of apex of discal cell very oblique, almost straight; sixth vein thick to apex, extending to margin of wing.

Length, 7 mm.

Localities: Herschel island, Yukon Territory, July 29, 1916; Cockburn point, Dolphin and Union strait, Northwest Territories, September 3, 1914 (F. Johansen).

Rhamphomyia conservativa, n. sp.

MALE. Black, subopaque. Wings brownish, more distinctly so basally. Halteres yellowish. Hairs and bristles black.

Eyes contiguous; third antennal joint nearly three times as long as its width at base; style stout, rather more than one-third as long as third antennal joint; proboscis about 1·25 as long as height of head. Dorsum of mesonotum rather densely hairy, the hairs upright, slender, and of moderate length; ventral plate between bases of fore coxæ bare; hairs in front of base of halteres long and dense; scutellum with eight to twelve fine hairs on posterior margin. Abodmen with rather sparse short hairs, whichare longer near posterior marginsof segments; hypopygium of the same general typeas that of *erinacioides*, but the portion that is directed cephalad over dorsum reaches about three-fourths of the way to base and is pale yellow in colour, contrasting strikingly with the dark abdomen; lower posterior angle of hypopygium produced caudad in the form of a short subtriangular process; hypopygial filament very thick for a short distance at base, then becoming abruptly setiform, hidden for the greater portion of its length. Legs slender, femora with a number of very short setulæ on ventral surfaces, which are confined to basal third on hind pair; apical two-thirds of hind femora and the whole of hind tibiæ ventrally with very dense microscopic pile, intermixed on the tibiæ with short erect spinules; basal joint of hind tarsus nearly as long as the next four joints combined, the entire tarsus much shorter than tibia; dorsum of tibiæ and tarsi with short setulæ; tarsal claws very much curved, sickle-shaped, of good size. Venation as in previous species except that the vein closing lower portion of discal cell is distinctly curved.

FEMALE. Similar in colour to the male, the wings more distinctly brownish.

Eyes separated by nearly twice the width across posterior ocelli. Dorsum of mesonotum with fewer and shorter hairs than in the male, the anterior acrostichals four to six-rowed. Abdomen pointed at apex. Legs more setulose than those of the male, the hind femora with setulose hairs on their entire ventral surface; ventral surface of hind tibiæ with short regular setulæ instead of erect pile; basal joint of hind tarsus longer than next four combined; tarsal claws much shorter than in male. Wings broader than in male, the venation similar, but vein closing lower portion of apex of discal cell less curved.

Length, 6·5–7·3 mm.

Type locality: West of Bernard harbour, Dolphin and Union strait, Northwest Territories, July 14, 1916. Paratypes, Herschel island, Yukon Territory, July 29, 1916; Bernard harbour, Northwest Territories, July 10, 18, 19, and August 1–7, 1915; Young point, Northwest Territories, July 18, 1916 (F. Johansen). Nine specimens.

Rhamphomyia sp.

Two larvæ of a species belonging to this genus are in the collection.

In length they are 13 mm., and in colour pure white, with the exception of the cephalic parts which are black. The general structure of the head is the same as that of *Rhamphomyia dimidiata* Loew, a species I have figured and described from Illinois.[1]

The mandibles are sharp and much curved, when fully protruded extending beyond apex of the sharply pointed labrum. The prothoracic spiracles are small, rounded, and slightly protruded. Apical segment of abdomen ending in four short, pointed processes, the two upper distinctly smaller than the two lower; spiracles rather small, round, situated on the under side of base of upper processes. No distinguishable hairs on body.

Localities: Demarcation point, Alaska, in wet moss-pillow, May 20, 1914; Bernard harbour, Northwest Territories, June 28, 1915 (F. Johansen).

DOLICHOPODIDÆ.

The larvæ of the dolichopodid genera in this collection are, as far as I know, found in muddy streams or pools. The imagines are predaceous, those of *Hydrophorus* and *Scellus* almost exclusively so, though *Dolichopus* is most frequently found feeding upon the nectar or honeydew on plants.

Dolichopus Latreille.

There are only two specimens of this genus in the collection, one male and one female, possibly representing only one species.

Dolichopus dasyops, n. sp.

MALE.—Blue-black, with a distinct cupreous tinge. Antennæ and arista black; face black, with dense yellowish brown pile; palpi yellow; proboscis black; postocular cilia entirely black; hairs on eyes yellow. Dorsum of thorax with coppery tinge; fringes of squamæ black. Hypopygium black, lamellæ white, blackened on apical margins and with black hairs. Legs yellow, fore coxæ slightly infuscated at bases, mid and hind pairs black; apices of hind tibiæ, apices of basal three, and all of apical two, joints of fore tarsi, all but base of mid tarsi, and entire hind tarsi fuscous. Wings clear, veins dark brown. Halteres yellow.

Eyes hairy; antennæ not elongated, third joint pointed, shorter than high (Pl. VII, fig. 8); arista with second joint much elongated, third densely pubescent; face parallel-sided, about one-sixth the head-width at its middle, not descending to lowest level of eyes. Scutellum with two strong bristles and two weak hairs. Hypopygial lamella as in Pl. VII, fig. 9. Fore coxæ with short black hairs, and a few long bristles near apex; fore tibia with three to four antero-dorsal, two postero-dorsal, and three to four posterior bristles; fourth joint of fore tarsi dilated from base to apex, fifth very much broadened, its width about equal to its length; mid tibia with one ventral, two to three antero-ventral, four to five antero-dorsal, and five to six posterior bristles; mid tarsi simple, with a few short bristles on apical half of basal joint, one of which on dorsal surface is conspicuous; hind femora with inconspicuous black hairs on apical portion of postero-ventral surface; hind tibia with short regular hairs on basal two-thirds of antero-ventral surface and one long bristle beyond these, antero- and postero-dorsal surfaces each with about eight long bristles; postero-dorsal surface with a slit at apex which runs forward on to dorsum; posterior surface densely black setulose on apical half; basal joint of hind tarsus with about eight bristles in two irregular series. Curve of fourth vein distinct but not abrupt; apices of third and fourth veins subparallel, costa not noticeably swollen at apex of first vein.

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[1] Bull. Ill. State Lab. Nat. Hist., vol. 12, art. 3, p. 401, 1917.

Length, 5·25 mm.

Type locality: Bernard harbour, Dolphin and Union strait, Northwest Territories, July 10, 1916 (F. Johansen).

This species is most closely allied to *brevipennis* Meigen, but differs in having the hind femora without long pale hairs on ventral surface.

Dolichopus, sp.

A female in collection which is in very poor condition may belong to *dasyops*. It agrees very well in colour with the male above described. The wing has a knot-like swelling on the costa at end of first vein. The hind tibia has on basal half of the postero-dorsal surface a distinct groove or channel which is evanescent at its extremities, and at apex on dorsal surface another short groove; the bristles on hind tibia are as follows: five almost exactly on the dorsal surface, six to seven on antero-dorsal surface, and four to five on antero-ventral surface which are very weak but increase in strength to apex.

Locality: Nome, Alaska, August 21, 1916 (F. Johansen).

Scellus Loew.

The flies of this genus are predaceous. There are six described North American species. The single species in the present collection was originally described from northern Europe and was recorded from Fort Resolution, Hudson Bay territory, by Loew. There are no subsequent records for North America.

Scellus spinimanus (Zetterstedt.)

Hydrophorus notatus Zetterstedt, Ins. Lapp., sp. 701, 1838.
Hydrophorus spinimanus, Zetterstedt, Dipt. Scand., vol. 2, p. 445, 1843.

Two males and ten females, Bernard harbour, Northwest Territories, August 26, 1915; two females, Cockburn point, Arctic coast, Northwest Territories, September 7, 1914 (F. Johansen).

Hydrophorus Fallen.

There are three species of this genus in the collection. The imagines are predaceous and run with great facility upon water surfaces. The genus is northern in its distribution.

Hydrophorus innotatus Loew.

Hydrophorus innotatus Loew, Mon. N. Am. Dipt., vol. 2, p. 212, 1864.

Represented in the collection by three specimens: two males, Bernard harbour, Northwest Territories, June, 1915; and one female, Collinson point, Alaska, June 20, 1914 (F. Johansen).

Originally described from Sitka, Alaska. I have seen examples from Pribilof islands.

Hydrophorus signiferus Coquillett.

Hydrophorus signiferus Coquillett. The fur seals and fur seal islands of the north Pacifi Ocean, vol. 4, p. 344, 1899.

I identify as this species twelve specimens, representing both sexes.

The species was originally described from a female specimen, and severa important characters are omitted. I, therefore, redescribe the species from both sexes.

Male and Female.—Black, with a distinct greenish lustre. Frons opaque black-brown; antennæ black; face greenish above, the surface with dense brownish pollen which rarely obscures the entire surface in either sex, face, below, entirely silvery pilose in the male, but in the female the greater portion is brownish pilose with normally a whitish area on each side; postocular region with numerous black bristles and yellow hairs. Thorax almost black, with a cupreous stripe along line of dorso-centrals and a broad sublateral vitta each side. Abdomen with a more pronounced greenish tinge than thorax and usually slightly cupreous on dorsum at base. Legs black, distinctly green-tinged, especially on dorsal surfaces of tibiæ. Wings clear, with a distinct brown spot on cross-vein and another before middle of last section of fourth vein. Squamæ with pale fringes.

Male.—Third antennal joint short, obtuse at apex; face in both sexes broad, slightly widened below, the upper half slightly vertically rugose. Propleura with a group of bristly black hairs above coxa, among which the normal bristle is barely distinguishable. Scutellum with four strong bristles. Fore femora in male excavated at apex below, and with four to five short stout bristles basad of the excavation, on the anterior side; base of femur slightly swollen, and near its antero-ventral edge with a series of five to seven widely-placed setulæ; ventral surface of fore tibia with a series of closely placed spines; fore tarsi normal; mid and hind femora not swollen, both pairs with a few bristles on apical half of antero- and postero-ventral surfaces; mid and hind tibiæ with a few widely placed bristles.

Female.—Similar to male except that the fore femora are not excavated near apex and lack the group of bristles on the antero-ventral side, and the fore tibia has less regular and slightly longer ventral bristles.

Locality: Teller, Alaska, two specimens, July 29, 1913, and ten specimens, August 6, 1913 (F. Johansen).

Originally described from Commander islands, Bering sea.

Hydrophorus pilitarsis, n. sp.

Male and Female.—Similar in colour to the preceding species, differing only in having the postocular cilia on lower half almost entirely yellow, and the fore coxæ with long yellow hairs and only a pair of black bristles at middle and a few black setulæ at apex instead of being almost entirely black setulose.

Male.—Face widest below middle, slightly narrowed at lowest extremity; antennæ as in *signiferus*. Propleura with one black bristle and a number of long yellow hairs. Fore femora more noticeably swollen than those of *signiferus*, not excavated at apex near base, with seven to eight stout, closely placed, rather short bristles on the ventral surface; a number of long black hairs on apical half of posterior surface; fore tibia thickened on apical half, the antero-ventral surface with dense microscopic pile and very minute spinules; fore tarsi with long black hairs on antero-ventral margin of basal and dorsal surface of next three joints; mid femora with four to five long, black bristles at base on antero-ventral surface and moderately long, black hairs on apical two-thirds of postero-ventral surface, the femora slightly bent; hind femora slender, straight, with short setulose hairs; mid and hind tibiæ with a few short bristles. Last sections of veins three and four conspicuously convergent apically, the dark spot on last section of four nearer middle of that section than it is in *signiferus*.

Female.—Similar to male except that the fore femora are less thickened, lack the basal series of strong bristles, and have the apical series of hairs on postero-ventral surface less closely placed. The mid femora have two to three strong bristles near base. The fore tarsi have only the normal hairs.

Length, 3·5–4·5 mm.

Type locality: Teller, Alaska, five specimens, July 29, 1913; one specimen, August 6, 1913 (F. Johansen).

This species may be distinguished from any previously described from North America by the hairy fore tarsi of the male and the presence of bristles near base of mid femora in both sexes.

PHORIDÆ.

The larvæ of the group in the present collection are found in fungi, manure, or decaying vegetation.

Aphiochaeta Brues.

Aphiochaeta alaskensis, n. sp.

MALE.—Black, subopaque. Legs black, fore tibiæ and tarsi, except tip, brownish yellow, bases of mid and hind tibiæ brown. Wings clear, veins dark. Halteres black, knobs testaceous yellow.

Post-antennal bristles four in number, the lower pair nearly as large as the upper, lower frontal bristles in a nearly straight transverse line; antennæ above the normal size, third joint round, slightly less than half as large as eye; palpi large, conspicuously setose; clypeus projecting, pointed; arista almost bare, longer than width of frons; bristles on cheek long and strong. Dorsum of thorax with rather dense setulose hairs; scutellum with two long apical bristles and two weak lateral hairs; mesopleura with a number of weak, hair-like bristles on upper posterior angle. Abdomen tapered to apex, with a few bristles on apical segment; hypopygium rather large, with a long bristle on each side near base, apical process large, oval. Legs slender; fore tarsi broad, hind femora with short close fringe at base ventrally; hind tibia with a fringe of six to seven short setulæ on the apical three-fourths. Costa extending just short of middle of wing, first division slightly longer than the other two combined, third, half as long as second; costal fringe very long and widely spaced, the bristles nearly twice as long as fork of third vein; fourth vein leaving just beyond fork of third, gently curved at base, nearly straight for the remainder of its length, slightly deflected at tip and ending slightly nearer to apex of wing than does fifth.

FEMALE. Similar to male. Differs in having the abdomen pointed at apex, the antennæ and palpi smaller, and the fore tarsi slender.

Length, 2 mm.

Type Locality: Nome, Alaska, August 24, 25, 1916 (F. Johansen). Eight specimens.

This species closely resembles *vulgata* Malloch, to which species it runs in my key to North American species.[1] It differs, however, in the much darker palpi, large antennæ, and shorter costa, and in several other characters.

Aphiochaeta platychira, n. sp.

MALE.—Similar in colour to the preceding species except that the halteres are entirely black.

Chætotaxy of head as in *alaskensis* except that the lower post-antennal bristles are very little more than half as large as the upper pair; antennæ normal in size; palpi not as strongly bristled as in *alaskensis*. Mesopleura bare; scutellum with two long bristles. Abdomen narrow, apices of segments laterally with a few long bristles, sixth with a number of bristles on posterior margin; hypopygium small, with one to two short bristles on each side, anal process small. Legs slender; fore tarsi broad, basal joint as broad as apex of tibia, and not over twice as long as broad; hind tibia with very short setulose hairs on postero-dorsal surface. Costa to very slightly short of middle of wing, first division 1·25 as long as next two together, third about two-thirds as long as second, costal fringe very long, the bristles twice as long as fork of third vein; fourth vein leaving beyond fork of third with a slight curve and running nearly straight to margin of wing, ending distinctly nearer to apex of wing than does fifth.

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[1] Proc. U. S. Nat. Mus., vol. 43, p. 452, 1912.

Length, 2 mm.

Type Locality: Nome, Alaska, August 21, 24, and 25, 1916 (F. Johansen).

This species runs down to *perplexa* Malloch in the paper previously referred to, but the colour of the legs, and the weaker tibial setulæ are sufficient to warrant their separation.

Aphiochaeta, sp.

A female in poor condition appears to be distinct from the previous species. It has the hind tibial characteristics of that species as well as the bare mesopleura, but in venation it agrees more nearly with *alaskensis*. It is not possible to satisfactorily describe the species.

Locality: Nome, Alaska, August 24, 25, 1916 (F. Johansen).

BORBORIDÆ.

The larvæ of this family live in manure, fungi, decaying vegetation, or, rarely, in putrid water in which there is decaying animal or vegetable matter.

Several species are commonly found in marshy spots, and I have seen the imagines running upon the surface of stagnant water. In winter and early spring some species occur under dry grasses amongst dead leaves, and when disturbed jump violently about much as do springtails found in similar situations.

There is only one species of the family in the collection.

Leptocera Olivier.

The species in this collection seems to be undescribed.

Leptocera transversalis, n. sp.

Female (alcoholic specimen).—Head yellow, ocellar triangle, upper half of occiput, greater portion of third antennal joint, arista, and clypeus black. Thorax bla[illegible]al margins, centre of scutellum, and the pleural sutures broadly, yellowish. Abdomen brownish black dorsally, venter largely yellow. Legs black, trochanters, apices of femora, bases of tibiæ, and the tarsi yellowish. Halteres pale. Wings clear.

Ocellar triangle large, sharp anteriorly, extending over midway from vertex to anterior margin of frons; orbital bristles three to four on each side, short but strong; interfrontalia with short setulose hairs, antennæ rather large, third joint rounded apically; arista very much shorter than in typical Leptocera, not twice as long as antenna, thickened at base, distinctly tapered, microscopically pubescent; vibrissa weak, genal bristle absent, the marginal bristles very short; cheek about one-third as high as eye. Thorax with numerous discal setulose hairs and only one distinct pair of bristles in dorso-central series, just in front of scutellum; posthumeral bristles absent; scutellum rounded, with a few very short discal hairs and four moderately long marginal bristles. Legs slender, without any distinct bristles, even on femora; hind tarsi with basal joint twice as long as second. Wing venation as in Pl. VIII, fig. 20, differing from that of most species of this genus in having the cross-veins very nearly directly below apex of first vein.

Length, 2·5 mm.

Type Locality: Pond at Collinson point, Alaska, June 13, 1914 (F. Johansen). Two specimens.

This species differs so strikingly from others in Leptocera that it might be placed in a new genus, but as several workers are now engaged in revising the family I prefer to leave its removal from or retention in the genus to their decision.

SYRPHIDÆ.

The larvæ of the species in the present collection are either aphidophagous (*Syrphus*, etc.) or feed in sewage or decaying vegetable matter such as is found in swampy places (*Helophilus*).

Melanostoma Schiner.

There are at least two species referable to this genus in the collection.

Melanostoma trichopus Thomson.

Syrphus trichopus Thomson, Kongl. Svensk. Fregatten Eugenies Resa Pmk., 1868. Jordan's Diptera, p. 502.

Four specimens agree with the description of this species, which was originally described from California and has since been recorded by Coquillet from Alaska.

Locality: Bernard harbour, Northwest Territories, July 10 and 18 19, and August 16, 1915 (F. Johansen.)

Melanostoma, sp.

A female differs from the preceding species in having the hind tarsi with the apical four joints much flattened and in being larger—8·5 mm. in length.

Locality: Herschel island, Yukon Territory, July 29, 1916 (F. Johansen).

Melanostoma, sp.

One male and one female, taken at Bernard harbour along with *trichopus*, differ from that species in being slightly smaller, 4·5 mm. in length, in having the long hairs absent on the fore and mid tibiæ and fore metatarsi, and the hind metatarsi less swollen in both sexes. The head of the male is missing, and that of the female is so much crushed that it is impossible to tell what the profile is like.

Locality: Bernard harbour, Dolphin and Union strait, Northwest Territories, July 15, 1915 (F. Johansen).

Scaeva Fabricius.

Scaeva pyrastri Linne.

Musca pyrastri Linne. Syst. Nat., Ed. 10, p. 549, 1758.

This European species seems to be generally distributed throughout the northwestern and western portions of this continent. It is represented in the present collection by two specimens from Barter island, Alaska, June 10, 1914 (D. Jenness).

Sphaerophoria cylindrica Say.

Syrphus cylindricus Say, Am. Ent., vol. 1, pl. 11, 1824.

A single male specimen from Herschel island, Yukon Territory, Canadian Arctic coast, August 13, 1914, differs from the normal North American form in the much darker abdomen and legs, the former having the second, third, and fourth segments each with a narrow, centrally interrupted yellow band, and the fifth segment with two small dorsal spots. Structurally the specimen differs not at all from specimens taken in Illinois and other parts of the United States and Canada.

Syrphus sodalis Williston.

Syrphus sodalis Williston, Synop. N. Am. Syrphidæ, p. 741, 1886.

This species was originally described from Colorado. There are three specimens in the present collection, one from Collinson point, Alaska, June 17, 1914, and two taken west of Kongenevik, Camden bay, Alaska, June 27, 1914 (F. Johansen).

The specimens agree in all particulars with the original description except that the third antennal joint is not distinctly reddish at base in the two last-mentioned examples.

Syrphus sodalis, var., **interruptus** var. n.

A female taken west of Kongenevik, Camden bay, Alaska, July 4, 1914, differs from the other specimens in having the abdominal yellow marks much smaller, the basal segment having two short, spot-like marks which do not reach the lateral margins, and the other segments having narrow, almost linear, marks. The antennæ are entirely black, and the tibiæ yellow. In other respects coloured as type form.

Length, 8 mm.

Helophilus Meigen.

The larvæ of species of this genus are as far as known found in mud and decaying vegetable matter in or along the margins of ponds or streams.

Helophilus dychei Williston.

Helophilus dychei Williston, Can. Ent., vol. 29, p. 135, 1897.

Two specimens of this species are in the collection from Nome, Alaska, August 24 and 25, 1916, and in that from Bernard harbour, Northwest Territories, on *Dryas* flower, July 6, 1916 (F. Johansen).

The species has previously been recorded from Alaska, being originally described from Sitka.

OESTRIDÆ.

Only three imagines of this family are in the present collection, but there are a number of larvæ of two species.

Œdemagena tarandi (Linné.)

Oestrus tarandi Linné. Faune Suecia, p. 1731, 1761.

Female.—Three females of this species were taken.

The species superficially resembles *Hypoderma lineata* De Vill., but the distinct palpi, and larger size, 15 mm, in addition to the differently coloured abdominal hairs readily separate it from that species. A brief description of the species is given as few descriptions in English are available to students.[1]

Head black, apex of second antennal joint and arista brown; hairs on frons, parafacial, and the upper half of face black, on occiput except along margin of eyes, on cheeks, and lower half of face pale yellow; palpi and proboscis black. Thoracic dorsum with long, erect, pale yellow hairs in front of suture and on postalar callosity, with black hairs caudad of suture; disc opaque black, with two submedian linear vittae in front of suture which are evident behind suture as two small spots, and with two broad lateral vittae behind suture which are present in front of suture as two small spots; pleura and scutellum with long pale yellow hairs. Abdomen with long pale yellow hairs on first segment, and similar hairs of a bright reddish orange colour on segments 2, 3, and 4 both on dorsum and venter. Legs black, tibiae except bases, and the tarsi tawny; all parts with black and yellow hairs intermixed, the pale hairs longer and more conspicuous at bases of femora and on apical halves of tibaie. Posterior basal cross-vein of wing distad of anterior; fourth vein continuing parallel to third for a considerable distance beyond outer cross-vein before curving forward.

Localities: Teller, Alaska, July 31, 1913; one specimen; Bernard Harbour, Northwest Territories, July 14, 1916, two specimens (F. Johansen).

Larvæ.—I identify as of this species larvæ taken from under the skin of Barren Ground caribou. The species was originally described from northern Europe and has been recorded from Alaska. The recorded host is the reindeer, but

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[1] For an account of *Œdemagena tarandi* see G. H. Carpenter, Journ. Econ. Biol., vol. 5, pp. 149-156, 1910.

I have no doubt that the specimens before me, all of which were taken from caribou, belong to *tarandi*.

Localities: Read island, Dolphin and Union strait, southern side of Wollaston peninsula, Victoria island, May 4, 1915 (D. Jenness); Bernard harbour, Northwest Territories, May 21, 1915 and Richardson sound, Coronation gulf, between Richardson island and Victoria island, March 21, 1916 (F. Johansen).

The mouth-parts of this species are very much aborted, the chitinized hooks so prominent in the larvæ of *Gastrophilus* being entirely absent. The only chitinized portions of the cephalopharyngeal skeleton that I find by dissection are two short rods that connect with the oral opening on its sides, and a poorly chitinized plate which covers the upper portion of the mouth and shields the opening of the oesophagus. The larvæ of *Hypoderma* and those of this genus are very similar, the only noticeable distinction being in the spinal armature of the body—the spines on dorsum of *Hypoderma* being much stronger than those on venter, whereas in *Œdemagena* they are of equal strength.

The antennæ in *Œdemagena* are small, their bases blackened, the distance between their bases about four times the width of their diameter; immediately above the antennæ there is an irregular transverse series of strong thorns, the bases of which are black and the apices yellow. Each segment has a circle of strong backwardly directed thorns anteriorly and another of much weaker forwardly directed ones posteriorly, both of which are interrupted at the transverse depressions which run the entire length of the body. (Pl. VIII, fig. 17). Posterior spiracles large, black, narrowly separated, structure as in Pl. VIII, fig. 14, the minute pale dots more regularly rounded than in drawing.

Length in final stage, 25 mm.; width, 10–12 mm.

Cephenomyia Latreille.

There are several larvæ of a species from the nasal passages of caribou which I identify as belonging to this genus. I can not identify the species from the material before me, but possibly it is undescribed in the imago stage.

Cephenomyia, sp.

LARVA. Whitish testaceous, the spinose armature black or black-tipped; posterior spiracles and mouth-hooks black. A few dots on segments of abdomen, most conspicuous and numerous on apical three segments.

Body much more slender than in *Œdemagena*, slightly tapered at both extremities. Mouth-parts well developed, dorsal view as in Pl. VIII, fig. 16, the hooks long and slender, curved, and sharp at apex. Each segment of body with stout, backwardly directed thorns on anterior half; posterior half of each dorsal segment bare on greater portion of its width, with two small oval swellings on each side, caudad of which there is a transverse series of stout thorns; mesad of these swellings, on each side, there is another, less conspicuous swelling behind which are no thorns; ventral segments similar to dorsal, but the submedian swellings are as distinct as the lateral; posterior spiracles in a very distinct depression, the upper and lower margins of the segment produced, the latter very decidedly elongated, and both evidently capable of retraction so as to shield the spiracles; caudal view as in Pl. VIII, fig. 18.

Length in final stage, 30 mm.; width, 9 mm.

Locality: Bernard harbour, Northwest Territories, May 25, 1916 (F. Johansen).

The larvæ closely resemble specimens before me named by C. H. T. Townsend *Cephenomyia pratti* Hunter. They differ, however, in having on most of the ventral abdominal segments a small median raised area, cephalad of the broad band of spines, upon which there are several strong spines. The penultimate ventral segment in the arctic species has more numerous anterior spines than has *pratti*, and there are several spines along the latero-ventral margin which I do not find in the latter. The apical spines are much more numerous in the arctic species than in *pratti*.

TACHINIDÆ.

The larvæ of nearly all of the species of this family are internal parasites in other insects, mostly in the larvæ or pupæ.

There are only two species in the collection.

Euphorocera gelida Coquillett.

Euphorocera gelida Coquillett, Revision of the Tachinidæ. Tech Ser., No. 7, U. S. Dept. Agr., Bur. Ent., p. 101, 1897.

There are thirteen specimens of this species in the collection.

Four of the specimens differ from the others, and from the original description, in having only three pairs of postural dorso-centrals. In other respects the specimens of both lots agree perfectly.

Pinned with several of the imagines is the empty puparium from which the insect emerged. A comparison of these puparia with those of *Euphorocera claripennis* Macquart shows that the two species are not congeneric. The characters of the puparium of *gelida* are as follows:

Brownish red, subopaque; posterior spiracles black-margined, glossy.

Surface microscopically, transversely striated; incisions between segments defined by a single series of short stitch-like impressions; each abdominal segment with three small depressed areas on centre of side, in each of which there is an irregular line of minute elevations visible only under a high-power lens; no respiratory elevations at base of abdomen; anal opening minute, considerably proximad of apex of abdomen, surrounded by a poorly defined granulose area; spiracles large, slightly elevated, especially above, general appearance and slits as in Pl. VIII, fig. 15.

Length, 8-9·5 mm.; width, 3-3·75 mm.

The puparium of *claripennis* differs in having the posterior spiracles with openings very pronouncedly sinuous, almost W-shaped as in Muscidæ, the segments with distinct though miscroscopic locomotor spinules, and the respiratory organs at base of abdomen in the form of stalks.

Locality: The specimens of *gelida* are from Camden bay, and Demarcation point, Alaska, June and July, 1914 (F. Johansen).

The puparia were from inside of the cocoons of a lepidopteron, *Dasychirus* sp. (?), sometimes as many as six in one cocoon. The records show that the larvæ of the host do not succeed in pupating. (Rearing 10).

Peleteria Robineau-Desvoidy.

This genus is represented in the collection by a single female.

Peleteria arctica, n. sp.

FEMALE.—Black, shining. Head black, cheeks except near posterior margin, face and its sides reddish yellow, densely white pruinose; interfrontalia reddish; orbits black, shining, but obscured by grey pruinescence; antennæ and arista black; proboscis black, palpi ferruginous.

Thorax slightly grey pruinose, not distinctly vittate; scutellum reddish yellow. Abdomen black, slightly grey pruinescent on bases of segments; sides of second and third segments broadly reddish. Legs black, hind tibiæ reddish. Wings slightly greyish. Calyptræ white. Halteres dark brown.

Frons bristled as in *robusta;* cheek with four well-differentiated bristles, two of which are much stronger than the others, the normal hairs strong; third antennal joint very little shorter than second; arista short, thickened to distinctly beyond middle; profile as in Pl. VIII, fig. 21. Dorso-centrals irregular in type, three strong ones on one side and three strong and one weak one on the other; three sternoplurals. Abdominal segments two to four with discal macrochaetæ. Wings as in *robusta.* Fore tarsi dilated.

Length, 9·75mm.

Type Locality: Cockburn point, Northwest Territories, Canadian Arctic coast, September 5, 1914 (F. Johansen).

The only species I find record of from the arctics is *aenea* Staeger, described from Greenland. This species has the abdomen entirely black and is apparently distinct from *arctica.*

CALLIPHORIDÆ.

This family contains a number of genera the larvæ of which feed normally in carrion. The flies are popularly known as flesh-flies, bluebottles, and blow-flies.

Originally the genera now included here formed part of the family Muscidæ but within recent years the latter has been divided, several families now containing genera that at one time formed part of the Muscidæ. It is at present, according to some entomologists, a debatable point whether our concept of the Muscidæ should not be revised to the extent of applying the name to what is now called Anthomyiidæ and dropping the last name entirely. With this view I do not agree, but the present paper is not the proper place to discuss the question, more especially as there are no true Muscidæ in the collection.

Cynomyia Robineau-Desvoidy.

There is but one species of this genus in the collection.

Cynomyia cadaverina Robineau-Desvoidy.

Cynomyia cadaverina Robineau-Desvoidy. Essai sur les Myodaires, p. 365, 1830.

Twenty-four specimens with data as follows: thirteen specimens, Bernard harbour, Dolphin and Union strait, Northwest Territor[illegible], May, June and July, 1915 and 1916 (F. Johansen); six specimens, Barter isla[illegible] Arctic coast of Alaska June, 20 and 23, and July 2, 1914, and June 15, 1914 [illegible] Jenness) three specimens, west of Kongenevik, Camden bay, Alaska, Ju[illegible] 4, 1914 and two specimens, Nome, Alaska, August 24, 25, 1916 (F. Johansen).

Calliphora Robineau-Desvoidy.

There is one species in the collection, represented by three specimens.

Calliphora viridescens Robineau-Desvoidy.

Calliphora viridescens Robineau-Desvoidy. Essai sur les Myodaires, p. 537, 1830.

This species occurs in Europe and North America. Like the preceding species it is generally distributed throughout North America, and has been previously recorded from Alaska.

Data on specimens: Nome, Alaska, June 21, 1916 (F. Johansen).

Phormia Robineau-Desvoidy.

There are two species in the collection, one of which, *terræ-novæ,* occurs generally throughout North America, and has been reported from Greenland and Alaska.

Phormia terræ-novæ Robineau-Desvoidy.

Phormia terræ-novæ Robineau-Desvoidy. Essai sur les Myodaires, p. 467, 1830

Thirty-eight specimens with data as follows: sixteen specimens, Bernard harbour, Dolphin and Union strait, Northwest Territories, June, July and August, 1915; one specimen, same locality, July 10, 1916; eight specimens, same locality, June and July, 1916; three specimens, Nome, Alaska, August 24, 25, 1916; five specimens, Teller, Alaska, July and August, 1913; three specimens, Collinson point, Alaska, June, 1914; two specimens, Demarcation point, Alaska, May 13, 1914 (F. Johansen).

Phormia caerulea, n. sp.

MALE AND FEMALE.—Dark metallic blue, without pruinescence. Head black, frons opaque, orbits slightly shining; third antennal joint sometimes brownish; palpi yellow, usually fuscous at apices in male. Dorsum of thorax with two slender, widely separated vittæ on anterior portion mesad of dorso-centrals. Legs black. Wings clear, slightly infuscated at extreme bases. Squamæ brown. Halteres fuscous, paler in female.

MALE.—Frons narrowest at centre, where it is one-fifth the head-width, orbit at widest part, just below ocelli, narrower than interfrontalia; orbits hairy, bristles differentiated but not very strong; arista rather short-plumed, apical third bare; profile as in Plate VIII, figure 19. Thorax not so noticeably depressed as in other species, the postsutural dorso-centrals sometimes well developed, the posterior pair usually so; both spiracles very large, the prothoracic one extending from close to upper margin of pleura to within a short distance of coxa, the covering of both spiracles deep black; lower margin of anterior spiracle with many long bristly hairs; upper calypter with long hairs on upper side, when closed. Hypopygium small; fifth sternite as in *terræ-novæ*. Legs as in *terræ-novæ*. Inner cross-vein very little proximad of apex of first vein; outer cross-vein less distinctly curved than in *terræ-novæ*; fourth vein almost rectangularly bent, usually with a short appendiculate vein at angle.

FEMALE.—Similar to the male in colour.

Differs in structure by having the frons two-fifths the head-width, the orbit half as wide as interfrontalia, with two distinct supraorbital outer bristles.

Length, 6–8·5 mm.

Type locality: Bernard harbour, Northwest Territories, May 24, 1915 (F. Johansen). Paratypes, same locality, May, June, and July, 1915, 1916 (F. Johansen).

This species resembles *Phormia terræ-novæ* very closely in some respects, but is undoubtedly distinct. Zetterstedt described a species from Greenland under the name *groenlandica*, which has been sunk as a synonym of *terræ-novæ*. As both species probably occur in Greenland it is not possible to decide the validity of the accepted synonymy without an examination of the type of Zetterstedt's species.

The appended key gives a summary of the distinguishing characters of the species.

KEY TO SPECIES.

MALES.

1. Eyes separated by a narrow line; anterior thoracic spiracle with yellow-haired covering-flaps . . . . *regina* Meigen.
   Eyes separated above by a space at least twice as broad as distance across posterior ocelli; anterior thoracic spiracle with black-haired covering-flaps. 2
2. Narrowest part of frons about one-half as great as width of eye seen from above; anterior thoracic spiracle very large; outer cross-vein of wing very slightly curved. *caerula*, n. sp.
   Narrowest part of frons not over one-fourth as great as width of either eye; anterior thoracic spiracle not very large; outer cross-vein of wing abruptly bent. . . . . *terræ-novæ* Robineau-Desvoidy.

FEMALES.

1. Anterior thoracic spiracle with yellow-haired covering-flap, calyptræ white .... *azurea* Meigen.
   Anterior thoracic spiracle with black-haired covering-flap, calyptræ brown 2
2. Anterior spiracle very large; orbit about one-half as wide as interfrontalia, face much produced below .... *cærula*, n. sp.
   Anterior spiracle not very large; orbit less than one-third as wide as interfrontalia below anterior ocelli, face moderately produced below.... *terræ-novæ* Robineau-Desvoidy

ANTHOMYIIDÆ.

The larvæ of this family are in most cases either scavengers or phytophagous, the greater number belonging to the former category. A few species are aquatic in the larval [illegible] stages, and some in the present collection belong to this group.

The imagines of the genus *Fucellia*, and those of the subfamily Cœnosinæ are predaceous, feeding upon other insects, especially Diptera.

Recently I published a key to the subfamilies of Anthomyiidæ in *The Canadian En*[illegible] may be used to advantage in connexion with the present [illegible] characters used in the key are the basis for the subfamily grouping in this paper.[1]

As two of the genera dealt with in this paper are now described for the first time I have given a [illegible] the genera dealt with as an aid to the recognition of the new forms.

KEYS TO GENERA OF PHAONINÆ IN COLLECTION.

MALES.

1. Hind tibia with a long bristle beyond middle on the postero-dorsal surface....... *Phaonia*.
   Hind tibia either without any bristle as above, or there are several of equal length in a series on postero-dorsal surface.......... 2
2. Hind tibia with several long bristles on postero-dorsal surface.......... 3
   Hind tibia with at most a few short bristles on postero-dorsal surface.......... 4
3. Pteropleura hairy; anterior intra-alar bristle absent or very weak; joints of fore tarsi without long bristles at apices ventrally.......... *Pogonomyioides*.
   Pteropleura bare or with one or two weak hairs; anterior intra-alar bristle strong; basal four joints of fore tarsi with long bristles at apices ventrally .... *Pogonomyia*.
4. Third antennal joint very little longer than second; arista much thickened and densely short-haired basally; facalia hairy more than mid-way to antennæ, bristles on tibiæ very weak; lower scale of calyptera attenuated posteriorly .... *Mydaeina*.
   Third antennal joint much longer than second; species without the above combination of characters.......... 5
5. Abdomen with dorso-central stripe; mid tibiæ with a number of bristles on posterior and postero-ventral surfaces.......... *Aricia* pt.
   Abdomen with paired spots on dorsum; mid tibiæ with two or three postero-dorsal bristles *Limnophora*

FEMALES.

1. None of the orbital bristles directed forward; cruciate frontals absent 2
   At least the lower one of the supraorbital bristles directed forward; cruciate frontals present.......... 5
2. Hind tibiæ with long, preapical postero-dorsal bristle .... *Phaonia*.
   Hind tibiæ without a long, preapical postero-dorsal bristle, sometimes a few short bristles present.......... 3
3. Orbits hairy and with long, slender bristles in two series, the outer series on upper portion of frons directed outward .... *Mydæina*.
   Orbits hairy or almost bare, with only one series of bristles.......... 4
4. Mid tibiæ without short bristles on postero-ventral surface .... *Limnophora*.
   Mid tibiæ with one or two bristles on poster-ventral surface.......... *Aricia*.
5. Pteropleura hairy on centre; anterior intra-alar bristle absent .... *Pogonomyioides*
   Pteropleura bare, rarely with a few hairs on disc; anterior intra-alar bristle strong *Pogonomyia*

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[1] Can. Ent. vol 49, p. 406, 1917.

Phaonia Robineau-Desvoidy.

The larvæ of this genus are very little known. The species that have been reared are scavengers in the larval stages, feeding in decaying vegetable matter.

There are several specimens in the collection that are referable to this genus, accepting as the criterion the character furnished by the bristling of the hind tibia.

Phaonia minima, n. sp.

Male. Black, shining. Thorax in type so badly crushed that it is impossible to say whether or not it is vittate. Abdomen with slight pruinescence and a dark central longitudinal stripe. Legs black. Squamæ and halteres yellow. Wings yellowish brown on anterior half.

Eyes bare, narrowly separated above, interfrontalia linear on upper half, not wider than orbit; antennæ short, third joint not twice as long as second; arista microscopically pubescent on basal half; cheeks high, but the head is in such poor condition that their armature and comparative height can not be definitely ascertained; palpi broader than normal. Presutural acrostichals strong, with one to two series of shorter hairs between the series; postsutural dorso-centrals four; prealar bristle very small; hypopleura and pteropleura bare. Abdomen narrow, subcylindrical; hypopygium small, fifth ventral sclerite with a rounded excavation, the lateral extensions small, glossy at apex. Legs rather slender, the tarsi noticeably so, and especially the basal joint of fore pair; fore tibia without bristles; mid tibia with one bristle near apex on posterior surface; hind femora slightly curved, thickened apically, the apical third on antero- and postero-ventral surface with a graduated series of long bristles; hind tibia with two antero-ventral, one antero-dorsal, and one long postero-dorsal bristle. Costal thorn small; outer cross-vein straight; last section of fourth vein barely twice as long as preceding section.

Female.—Colour as in the male except that the wings and calyptræ are more conspicuously yellowish.

Eyes more than one-third the head-width, orbits shining, each one-fourth the width of inter-frontalia, orbital bristles normal, rather weak above, strong below; antennæ as in male; cheeks one-fourth as high as eye, invaded on lower half by the bristles of margin, those on margin of moderate length, vibrissæ well differentiated, one strong bristle below vibrissa. Thorax as in male. Legs similar to those of male but the tarsi stouter, the hind femora less distinctly swollen apically, and with fewer bristles.

Length, 4·5 mm.

Type Locality: Nome, Alaska, August 21, 24, and 25, 1916 (F. Johansen).

This species is the smallest known to me

Phaonia imitatrix, n. sp.

Male.—Black, distinctly shining, thorax and abdomen unmarked. Frontal and facial orbits with dense, silvery pile; cheeks and face very slightly pilose; inter-frontalia opaque black. Wings slightly fuscous, noticeably so at base. Squamæ white. Halteres black

Eyes hairy, separated by about one-sixth the head-width, orbit about one-third as wide as interfrontalia, bristles strong, with the exception of the upper backwardly directed one, directed inward; antennæ short, not extending below lowest fourth of face, third joint 1·5 as long as second; arista subnude, with an elongate tapered swelling at base; orbits in profile projecting beyond eye as far as width of third antennal joint; cheek as high as one-third the eye-height, protruding at anterior angle further than frons at base of antennæ, marginal bristles numerous, of average strength, a few weak hairs above margin; palpi about as long as apical portion of proboscis, slender. Dorsum of thorax with long setulose hairs; presutural acrostichals long but not strong, irregularly four-rowed; postsutural dorso-centrals four; prealar bristle very long. Abdomen narrow, subcylindrical, slightly tapered posteriorly; hypopygium small; fifth ventral segment almost transverse apically; dorsum with strong setulose hairs, apical and discal bristles on segments three and four. Legs stout; fore tarsi similar to those of *Trichopticus*, short, and densely short pilose ventrally; fore tibia unarmed; mid femora with slender bristles on postero-ventral surface which are longest on centre; mid tibia with two or three posterior bristles; hind femora with short bristles on basal half ventrally, and an antero-ventral series of long, stout bristles; hind tibia with four to five short antero-ventral, two to three longer antero-dorsal, and one long postero-dorsal, bristles. Costal spine short but distinct; third vein bare, outer cross-vein nearly straight; last section of fourth vein less than 1·5 as long as preceding section.

Length, 7·5 mm.

Type Locality: Bernard harbour, Dolphin and Union strait, Northwest Territories, July, 1916 (F. Johansen).

This species resembles in general appearance species of Trichopticus, but the hind tibiæ are not fringed, the tibiæ of all legs are less bristly, and the mid femora are normal in shape.

Mydaeina, n. gen.

Generic Characters: MALE.—Eyes distinctly separated, narrowest part of frons about one-sixth as wide as head, orbits with long hairs on entire length from base of antennæ to vertex; face and frons slightly projecting; antennæ short, third joint equal in length to second; arista tapered, second joint much thickened, as broad as long, third much thickened at base, gradually tapering to a hair at apex, the pubescence dense and short; facial ridges with moderately long hairs which are carried upward half-way to base of antennæ; vibrissæ poorly differentiated from the long bristly hairs; proboscis stout; palpi slender. Dorsum of thorax with long hairs among which the dorso-centrals are hardly distinguishable; lower scale of calyptræ much larger than the upper, narrowed posteriorly. Abdomen subcylindrical, with four distinct dorsal segments; hypopygium small (Pl. IX, fig. 31); fifth ventral segment with a broad central emargination (Pl. IX, 29). Legs stout, with few distinct bristles, ventral surface of fore tarsal joints with dense erect pile, the bristles sparse short, confined to margins; preapical dorsal bristle of hind tibiæ absent or represented by a weak setula. Wing venation as in *Mydaea*, the veins without bristles.

FEMALE.—Differs from the male in having the frons nearly half the head-width, each orbit nearly as wide an interfrontalia and with numerous long hairs, an inward series directed inward, and an outer series, directed outward, longer than the others; head in other respects as male, but the arista is slightly less conspicuously swollen and less hairy. Thorax with the dorso-centrals more distinct than in male.

Mydaeina obscura, n. sp.

MALE AND FEMALE.—Black, opaque, the surface obscured by brownish pruinescence. Calyptræ in male subfuscous, in female yellowish. Halteres yellow. Wings slightly greyish, subfuscous at base.

Head of male as in Pl. IX, fig. 28. Four poorly distinguished postsutural dorso-centrals present; disc of scutellum hairy, margin with four bristles; sternopleura with one large posterior bristle and many long hairs. Legs with very few bristles, those on femora long but hair-like, the tibiæ without well-developed apical bristles, one near apex of dorsal surface of hind pair about as long as diameter of tibia; the bristles on tibiæ that are sometimes distinct are as follows

—one on the posterior side at middle of fore pair, one to two on antero-ventral, one to two on antero-dorsal, and one to two on postero-dorsal surface of mid pair, one on antero-ventral, one on antero-dorsal, and one on posterior surface of hind pair. Outer cross-vein in male at its own length from inner and at more than that length from end of fifth vein, in female it is slightly more than its own length from inner, and at its own length from end of fifth; last section of fourth vein four times as long as penultimate in male, three times in female.

Length, 6-7 mm.

Type Locality: Bernard harbour, Dolphin and Union strait, Northwest Territories, June, 1916, one male specimen (F. Johansen). Paratypes, same locality, August 4, 1915 (F. Johansen); and Colville mountains, Wollaston peninsula, Victoria island, July 22, 1915 (D. Jenness).

In the collection I find one larva, and several puparia that agree with the puparium mounted on the pin with the type specimen. These puparia (Pl. IX, fig. 22) differ from any others in the family that I have seen. Descriptions of larva and puparium follow.

Larva.—Whitish testaceous. Cephalopharyngeal skeleton, locomotor spines, and posterior spiracles black.

General form similar to that of Anthomyiinæ but the apical segment is slightly more elongate, noticeably tapered towards apex, and the spiracles are pedunculate, and situated upon two rounded fleshy elevations (Pl. IX, fig. 25). Antennæ very minute; cephalopharyngeal skeleton well developed, mouth-hooks paired, long and slender (Pl. IX, fig. 24). Prothoracic spiracles not developed; body very minutely striated, the segments well differentiated; lateral fusiform area well defined; each segment except apical with four short lateral longitudinal series of dark spot-like markings showing through the skin (Pl. IX, fig. 26); apical segment unmarked, anal opening at anterior margin, with a pseudopod-like protuberance on each side which is about as long as its basal diameter, tapered apically, and armed at apex with numerous short thorns; the ventral surface of each of the other segments with three short transverse series of dark spots, about three in number, the two outer situated at middle, the central one slightly cephalad of these; locomotor spinules on all except apical segment not noticeably elevated.

Length, 10 mm.

Puparium (Pl. IX, fig. 22). Reddish brown, slightly shining, posterior spiracular region black.

Surface minutely transversely striated, and with much less distinct and less regular wrinkles transversely on segments; anterior spiracles not distinguishable; thoracic segments much less distinctly striated than abdominals, and with microscopic locomotor setulæ; each abdominal segment with an oval clump of short black thorns on each side of median line on ventral surface, on each side of the incisions also with a band of more minute spinules; antepenultimate segment much constricted and more closely and distinctly longitudinally striated than the others; anal opening in the form of an elongate slit surrounded by a slight rim which encloses a broadly rounded dark brown area 1·5 times as wide as long; on each side of the anal opening and at a considerable distance from it there is a small clump of short, black spines on a slight eminence; posterior spiracles elevated, surrounded by a coarsely granulose blackened area, the openings small, as shown in Pl. IX, fig. 23.

Length, 12·5 mm.

The larvæ live in ponds and are truly aquatic. The principal characteristics of the larvæ are the clumps of locomotor spines on abdomen, the pseudopod-like anal locomotor organs, and the absence of prothoracic spiracles. The caudal part beyong the constriction in puparium is not occupied by any part of the enclosed imago after the induration of the larval skin, and forms an air chamber which serves to keep the puparium at the surface, the posterior spiracles being in this position and so held that they have direct contact with the atmosphere.

Johansen in his notes sketches one of the puparia so curved that the cephalic extermity extends to or almost to the surface, which is assumably the position immediately before the emergence of the imago, but all the empty puparia in the collection are nearly straight. (**Rearing 78**).

The puparium of *Hydrophoria*, an aquatic genus, is not conspicuously dissimilar from those of terrestrial Anthomyiidæ, showing no caudal modification or specialization such as is shown in the present genus.

The imago bears a resemblance to some species of *Aricia*, but differs in having the facalia hairy for a greater length above the vibrissæ, the third antennal joint much shorter, the under scale of calyptræ much narrower, and the fore tarsi without spines on ventral surfaces. The female resembles *Aricia* also, but has, in addition to the differences present in the males, the orbits much more hairy, the upper portion with a double series of long, hair-like bristles, the outer series directed out over the eyes.

In some respects the genus resembles ***Trichophthicus***, especially in the character of the fore tarsi, but the tibiæ in ***Trichophthicus*** are strongly spinose, the third antennal joint is much longer than the second, and the hind coxæ have hairs above at apex.

Aricia Robineau-Desvoidy.

I refer one species in this collection to this genus, although the male differs in many respects from the genotype, and in general habitus resembles ***Trichopticus*** Rondani. From ***Trichopticus*** the present species differs in having the posterior coxæ bare above at apices.

Aricia borealis, n. sp.

MALE. Black, shining. Interfrontalia opaque black, orbits silvery pilose. Thorax very slightly greyish priunescent, not distinctly vittate. Abdomen when viewed from behind, with brownish pruinescence and a black median longitudinal stripe. Legs black. Wings slightly greyish, fuscous at bases. Squamæ yellow. Halteres black.

Eyes bare, separated by about one-seventh the head-width; orbits linear above, not one-third as wide as interfrontalia at its narrowest point; antennæ short, third joint 1·5 as long as second; arista almost entirely nude; cheek with many long hairs; vibrissa poorly differentiated; orbit in profile projecting beyond eye farther than width of third antennal joint. Presutural acrostichals irregularly four-rowed; postsutural dorso-centrals four in number; prealar bristle weak but distinguishable; sternopleura with long hairs and two strong bristles; pteropleura and hypopleura bare. Abdomen subcylindrical, slightly tapering to apex; fifth sternite with small rounded central excavation in posterior margin. Fore tibia with three to four bristles in a single series on apical third of postero-ventral surface; mid femora slightly attenuated apically, with two to three long bristles at base on anterior side; mid tibia with almost the entire length of the postero-dorsal surface with short bristles, two to three on posterior surface, and three to four on postero-ventral surface beyond middle; hind femora with bristles on entire length of antero-ventral surface, the postero-vental surface unarmed; hind tibia slightly curved, the apex on ventral side very distinctly produced, anterior and posterior surfaces with short, regular, setulose hairs, those on postero-dorsal surface longest (Pl. IX, fig. 27); hind tarsi with a pair of bristles at base of first joint noticeably longer than the others. Last sections of third and fourth veins parallel; outer cross-vein slightly curved, last section of fourth vein 2·5 as long as preceding section.

Length, 7·5 mm.

Type locality: Bernard harbour, Dolphin and Union, strait, Northwest Territories, July, 1916 (F. Johansen).

With the male are several females which I consider to be of this species. The description is as follows:—

Black, less distinctly shining than the male, the thorax very densely pruinescent, the centre with two narrow, pale grey vittæ, and the lateral margins broadly pale grey. Abdomen immaculate. Wings slightly greyish. Calyptræ white. Halteres yellow.

Frons, at vertex, about two-fifths the head-width, slightly broadened anteriorly, each orbit at middle about one-third as wide as interfrontalia, the surface with many short hairs, four to six incurved bristles on lower portion and two slightly outwardly-directed ones on upper portion; cheeks higher than in male and with very few short hairs above the marginal bristles. Thorax much less hairy than in the male, the prealar bristle absent. Abdomen pointed at apex. Bristling of the tibiæ very variable, fore pair with zero to three posterior and zero to three postero-ventral bristles, and very rarely one antero-dorsal; mid pair usually with one or more ventral, two to four antero-dorsal, three to four postero-dorsal, and three to four postero-ventral bristles; hind pair with from two to five bristles on antero-ventral, antero-dorsal and postero-dorsal surfaces.

Localities: one specimen with same data as male; one specimen same locality as foregoing but with date of July 10, 1916; one specimen, Young point, Northwest Territories, July 18, 1916; one specimen, cape Bathurst, Northwest Territories, July 26, 1916; one specimen, west of Konganevik, Camden bay, Alaska, July 4, 1914 (all F. Johansen).

This species differs from any member of this genus known to me in the structure and armature of the hind tibiæ, the bare eyes, almost bare arista, and black halteres.

Limnophora Robineau-Desvoidy.

There are two specimens in the collection referable to this genus, a male and a female, neither of which it is possible to identify conclusively because of the poor condition. The only species of the genus which I have previously seen from the arctics of this continent is *nobilis* Stein. Neither of the specimens before me belongs to that species, and apparently they differ specifically from each other also.

The immature stages of the genus are unknown. The flies are commonly found close to water, being usually abundant on the shores of lakes and rivers, and some of the most aberrant forms occur on the seashore.

I have found one species in Scotland feeding upon insects, but whether it killed the specimens itself or merely appropriated the discarded prey of other predators I can not say as I did not see it catch any flies. The proposcis is not adapted for piercing, though armed at apex with chitinous rods which may serve to abrade the integument and so enable the insect to feed in a predatory manner.

Limnophora, sp. 1.

A male specimen taken at Cockburn point, Dolphin and Union strait, Northwest Territories, September 7, 1914 (F. Johansen), has the eyes separated by slightly more than the distance across posterior ocelli, the orbits narrower than interfrontalia at its narrowest point; arista pubescent; thorax with three strong pairs of postsutural dorso-centrals; presutural acrostichals irregularly four-rowed; abdomen with large, subtriangular, separate, brown spots; fore tibia with one posterior bristle; mid tibia absent; hind tibia with two antero-dorsal, and two weak postero-dorsal bristles; third vein bare at base; veins three and four divergent apically, last section of four about 2·5 as long as preceding section; outer cross-vein straight.

Length, 4·5 mm.

This species differs from any I have seen from North America, but owing to the very close resemblance between species of this genus and the poor state of preservation of the specimen I do not consider it advisable to give it a name.

Limnophora, sp. 2.

A female taken on Herschel island, Yukon Territory, July 29, 1916 (F. Johansen), differs from the foregoing in having four pairs of postsutural dorsocentrals, the acrostichals two-rowed, dorsum of thorax distinctly trivittate, mid tibia with two antero-dorsal and three postero-dorsal bristles, hind tibia with one antero-ventral, two antero-dorsal, and two postero-dorsal bristles, and the last section of fourth vein comparatively longer.

Length, 4·75 mm.

Pogonomyia Rondani.

This genus has much in common with *Trichopticus*. In fact it is difficult to separate the males of some species from those of *Phaonia* and *Trichopticus*. The male of *Pogonomyia nitens* Stein was described as a *Spilogaster*, though the author of that description recognized the female as a *Pogonomyia*—an error which led me into describing the species in that genus under the name *Pogonomyia flavinervis*.

The characters which are of service in separating *Pogonomyia* from *Trichopticus* are summarized as follows:—

Male.—Eyes bare; prealar bristle long; fore tarsi short and with erect short pile ventrally, the other tarsi spinose ventrally; hind tibiæ not curved, with long and short bristles, without fine hairs; hind coxæ bare above at apices.

Female.—Differs from the male by the widely separated eyes; in other respects similar, but with the lower supraorbital bristle directed forward and with cruciate frontal bristles, characters which separate the genus from both *Phaonia* and *Aricia*.

There is one species in the collection, represented by one female, which lacks the abdomen but is otherwise in good condition. The species resembles *alpicola* Rondani, a European species reported as occurring in North America.

Pogonomyia quadrisetosa, n. sp.

Female.—Black, shining. Orbits, ptilinum, and upper portion of cheeks silvery pilose, face and lower portion of cheeks less distinctly silvery. Dorsum of thorax slightly greyish brown pruinescent, with three poorly defined vittæ anteriorly. Abdomen missing. Legs black. Wings clear, veins yellowish except costa and base of first. Calyptræ whitish yellow. Halteres black.

Cruciate frontal bristles strong; orbitals as in *nitens* Stein, except that the weak hairs are more numerous; orbits in profile projecting as far beyond eye as half the length of eye—much farther than in *nitens;* anterior angle of cheeks protruding farther than frons at base of antennæ; third antennal joint slightly longer than second; arista microscopically pubescent; vibrissa very little stronger than the other bristles, the latter covering a larger area than in *nitens;* palpi much shorter than in *nitens.* Thorax with presutural acrostichals weak, irregularly two or three-rowed; postsutrual dorso-centrals four in number rather weak; prescutellars as strong as dorso-centrals; pteropleura in type with a long hair near middle. Fore tibia with three to four bristles on apical half of postero-ventral surface; mid femora with a series of long bristles on antero-ventral surface; mid tibia with three to four antero-ventral, four to five antero-dorsal, five to six postero-dorsal bristles, and three to four postero-ventral bristles; hind femora with a series of long bristles on antero-ventral surface; hind tibia with five to seven long bristles on antero-ventral, antero-dorsal, and postero-dorsal surfaces. Venation as in *nitens.*

Length, 6·7 mm.

Type locality: West of Bernard harbour, Dolphin and Union straits, Northwest Territories, July 14, 1916 (F. Johansen).

The type specimen differs from any previously described species of the genus in having four postsutural dorso-centrals. If the specimen is abnormal in this respect it can be separated from *nitens* by the presence of the long bristles on the antero-ventral surface of the mid femora; from the species identified by Stein as *alpicola* Rondani, by the yellowish wings, almost bare arista, and the mid-femoral bristles.

A third species which occurs in the United States, and which resembles *alpicola*, is separable from *quadrisetosa* by the more loosely pilose fore tarsi, the more widely spaced and longer bristles on latero-ventral margins of the mid and hind tarsi, the darker wings, and the shorter papli, the latter being less than half as long as the apical portion of the proboscis.

A fifth, and probably a sixth species, found in Colorado, are very distinct from *quadrisetosa*.

Pogonomyioides, n. gen.

Generic Characters.

FEMALE. Resembles ***Pogonomyia***, differing principally in the prealar bristle being weak or absent and in having the pteropleura with a number of long hairs on centre. The only species of *Pogonomyia* in which I have seen any hairs on the pteropleura is the one described in this paper. In addition to the above characters the intra-alar bristles are practically absent in Pogonomyioides, usually only the posterior one being distinguishable and that very weak, and there is no long bristle at apex of fore tibia on venter, nor are there any conspicuous bristles at apices of fore tarsal joints ventrally.

In other respects as *Pogonomyia*.

Type, *Pogonomyioides atrata*, n. sp.

Pogonomyioides atrata, n. sp.

FEMALE. Puparium: Brownish red, slightly shining. Surface microscopically granulose, almost without striæ above, finely but very distinctly transversely striate ventrally, becoming more coarsely so posteriorly. Posterior portion of cephalopharyngeal skeleton very slender, as shown in Pl. IX, fig. 30; dorsal half of thoracic segments absent; apex with a concentrically ridged rim surrounding a small but deep cavity; locomotor processes apparently lacking, except in center of each ventral segment, where there is a single transverse series of microscopic elevations extending nearly across the segments; a single series of small, stitch-like impressions between all segments, which is duplicated and surrounds the lateral fusiform area, three or four, short, irregular, longitudinal series of minute elevations on each segment laterally; base of abdomen with the pair of respiratory tubercles well developed, slender, about six times as long as thick at base; apical segment irregularly shrunken (possibly abnormal), a large depression caudad of spiracles and extending forward to posterior margin of penultimate segment, a subtriangular depression situated in extreme apex, and a large one on lateral area; spiracles slightly elevated, separated by less than three times their own diameter, the openings directed dorsad, ventrad, and laterad respectively.

Length, 6·5 mm.

Imago: Black, slightly shining. Orbits and upper part of cheeks silvery pilose. Thorax with slight greyish pruinescence, distinctly but not conspicuously quadrivittate. Abdomen slightly and evenly grey pruinose. Wings clear. Calyptræ yellowish. Halteres black.

Frons about two-fifths the width of head, each orbit above about one-fifth as wide as interfrontalia; interfrontal cruciate bristles strong; orbitals as in

Pogonomyia quadridetosa; antennæ short, third joint less than twice as long as second; arista bare, second joint as long as thick, third swollen for about one-third of its length; cheek about one-fourth as high as eye, densely haired on lower half, the bristly hairs almost uniform in length and strength, vibrissæ well differentiated; palpi slender, nearly as long as apical portion of proboscis. Dorsum of thorax not very conspicuously hairy; presutural acrostichals weak, irregularly four-rowed; postsutural dorso-centrals four, prealar bristle very small; a group of numerous bristly hairs above fore coxæ; sternopleura with very long hairs and two strong bristles, one in front and the other behind. Abdomen with short bristly hairs and no long bristles. Legs similar to those of Pogonomyia in form; fore coxæ without stout bristles; fore tibia with two to three weak posterior bristles, apical spines short ventrally; mid femora with a few weak bristles on basal half of antero-ventral surface; mid tibia with two to three antero-ventral, two to four antero-dorsal, four to six postero-dorsal, and two to three postero-ventral bristles on surface; hind femora with rather weak bristles on greater portion of antero-ventral surface; hind tibia with three to four antero-ventral, three to five antero-dorsal, and six to eight postero-dorsal bristles, none of which are very long; mid and hind tarsi with short, rather closely placed bristles. Costal thorn indistinct; outer cross-vein straight; last section of fourth vein about 1·75 as long as preceding section.

Length, 7 mm.

Type locality: Bernard harbour, Dolphin and Union strait, Northwest Territories, July 7, 1915 (F. Johansen).

I have seen a series of specimens of this species from the arctic region in another collection, and find that the pteropleural hairs are rarely absent. The characterization here given holds good throughout the series.

COENOSIINÆ.

There are two imagines of this sub-family in the collection. Both belong to the genus *Coenosia* and represent different species, but only one is in good enough condition to permit of its identification.

Coenosia octomaculata Zetterstedt.

Coenosia octomaculata Zetterstedt. Ins. Lapp., p. 141, 1840.

This northern European species has not hitherto been recorded from this continent. Although very closely resembling *geniculata* Fallen, it is very readily separated from it by the much smaller lower squama, which barely projects beyond the upper. In the specimen before me the mid tibiæ have the antero-dorsal and postero-dorsal bristles at the same height, whereas in my specimens of *geniculata* from Illinois the antero-dorsal one is much nearer apex of tibia.

Locality: Nome, Alaska, August 24 and 25, 1916 (F. Johansen).

Coenosia, sp.

One female in very poor condition. The legs appear to be black or fuscous, with only the bases of the tibiæ pale.

Locality: Bernard harbour, Dolphin and Union strait, Northwest Territories, July 10, 1915 (F. Johansen).

ANTHOMYIINÆ.

There is one genus in this collection which has been previously known from arctic Europe only, and another has been listed as belonging to *Anthomyia*. In order to make clear the generic relations of these I have drawn up an abridged key to genera which is presented herewith.

KEY TO GENERA IN COLLECTION AND THE GENERA MOST CLOSELY ALLIED THERETO.

1.	Eyes hairy	2
	Eyes bare	3
2.	Abdomen broadly ovate, little longer than broad; eyes in male distinctly separated; in female the width of frons is very little more than that of male	*Alliopsis* S. and D.
	Abdomen narrow, almost parallel-sided, much longer than broad; eyes in male contiguous, in female separated by at least one-third the width of head	*Lasiops* Meigen.
3.	Calyptra decidedly unequal in size, the under one projecting beyond upper	4
	Calyptra not as above, the lower one not projecting	5
4.	Lower calypter very much longer than upper; arista plumose	*Hydrophoria* R.-D.
	Lower calypter not much longer than upper; arista almost bare	*Egle* R.-D.
5.	Legs black; arista pubescent or bare	*Phorbia* R.-D.
	Legs black, or with tibiæ pale; arista hairy or plumose	*Hylemyia* Meigen.
	Legs with at least the tibiæ pale; arista pubescent or bare	*Pegomyia* R.-D.

The last three genera are poorly defined and overlap considerably, but my studies of the family have not been brought to the point where I am prepared to publish reliable characters for their differentiation, so I use the generally accepted characters. I have in preparation a generic synopsis of this and other subfamilies which I hope to publish shortly.

Hydrophoria Robineau-Desvoidy.

The only species of this genus on which I possess information concerning the early stages is aquatic. The flies are always found in the vicinity of rivers or ponds.

There is only one species in the present collection, which is described as new.

Hydrophoria arctica, n. sp.

MALE.—Black. Frontal triangle opaque black, orbits, cheeks, and face white pilose. Legs black, tibiæ slightly brownish. Wings greyish, veins black. Squamæ white, with yellow margins. Halteres brownish yellow.

Interfrontalia obliterated below ocelli, the orbits at this point linear; third antennal joint about 1·5 as long as second; arista tapered on basal half, long-haired to middle, bare apically; orbit in profile extending beyond eye as far as width of third antennal joint; cheek 1·5 as high as width of orbit; vibrissa long, marginal bristles on cheek long and strong. Presutural acrostichals weak, hardly distinguishable among the irregularly four rowed hairs, prescutellars hair-like; prealar bristle about one-fourth as long as the bristle behind it; sternopleurals two: two, the lower anterior one weak; upper margin of hypopleuræ hairy proximad of spiracle. Abdomen short and broad, cylindrical, segments with long bristles on posterior margins; hypopygium with basal segment polished, the apical, recurved one slightly prominent, armed with many long strong bristles; fifth ventral segment densely covered with setulose hairs. Fore tibiæ with two bristles; mid tibia with two to three antero-ventral, three to four antero-dorsal, two to three postero-dorsal, and three to four postero-ventral bristles; almost the entire length of mid-femora with long bristles on the antero and postero-ventral surfaces; hind tibia with five to six short bristles on antero-ventral surface, seven to eight irregular ones on antero-dorsal, seven to eight on postero-dorsal surface, one beyond middle being very long. Costal thorn at least as long as inner cross-vein; outer cross-vein very much flexed; last section of fourth vein about 1·5 as long as preceding section.

FEMALE.—Similar in colour to the male.

Frons opaque black, densely brown pruinescent, nearly half as broad as head; orbits broad, each at broadest part nearly as broad as orbit at same part; cruciate bristles strong; supra-orbital bristles four in number, the lower one directed slightly outward and forward, the others directed outward; orbital hairs numerous and nearly as long as the bristles; one to two long bristles situated above vibrissa. Abdomen tapered at apex; last segment not exposed, making it impossible to say if it is armed with curved thorns. Legs and wings as in male.

Length, 6 mm.

Type locality: Cockburn point, Dolphin and Union strait, Northwest Territories, September 5, 1914 (F. Johansen). Allotype, Bernard harbour, Northwest Territories, June 1915, (F. Johansen).

This species agrees with *divisa* Meigen in having the hypopleura with hairs on upper portion, but differs from it and all other species known to me in having the orbit in the female armed with long hairs in addition to the bristles, and in the very conspicuously bristly hypopygium and long costal thorn.

A female specimen, in very poor condition, from Collinson point, Alaska, June 22-23, 1914, may represent a distinct species. The mid tibia on one side is gone, but the one remaining is reddish and less bristly than in *arctica*, but without better preserved examples it is impossible to say definitely as to its specific identity.

Alliopsis Schnabl and Dziedzicki.

Generic Characters.

MALE.—Very robust. Head large, eyes long-haired, narrowly separated above; antennæ shorter than face; arista almost bare; cheeks with very numerous long bristles on lower margin and anteriorly, the vibrissæ not differentiated. Thorax with three pairs of postsutural dorsocentrals; calyptræ of moderate size, lower scale not projecting. Abdomen broad ovate, its length barely exceeding its greatest width; hypopygium small; apical visible ventral segment with a wedge-shaped central incision. Legs stout, strongly bristled. Sixth vein extending to margin of wing.

FEMALE.—Head as in male but the eyes are more widely separated; orbital bristles numerous, hair-like, erect and slightly inwardly directed, outer supraorbitals and cruciate interfrontal bristles absent. In other respects similar to male, the abdomen not so broad and more pointed apically.

Alliopsis obesa, n. sp.

MALE.—Black, shining. Wings slightly greyish, fuscous at base. Squamæ grey, margins brown. Halteres yellow, knobs brown.

Narrowest part of frons as wide as distance across posterior ocelli, the orbits linear above and not over one sixth as wide as interfrontalia; profile as in Pl. X, fig. 33; hairs on eyes pale. Dorsum of thorax with long hairs; acrostichals long and hair-like, irregularly four rowed cephalad of suture; posthumeral and presutural bristles strong, the latter duplicated on both sides, and the former on one side, in type; prescutellar bristles weak; scutellum with four long marginal bristles, numerous long discal hairs, and very distinct ventral pile; propleura above coxæ with a conspicuous clump of long bristly hairs; sternopleurals three in number; hypopleura bare. Abdomen with long setulose hairs on entire surface, those at apices of segments bristle-like; fourth segment the shortest; hypopygium very small, globose, glossy. Legs rather densely covered with moderately long setulose hairs; bristles on fore and mid tibiæ hardly distinguishable from the hairs but apparently as follows: fore tibiæ with two to three on postero-dorsal surface; mid tibiæ with two to three on each of the following surfaces—antero-dorsal, postero-dorsal, and postero-ventral; hind femora with long bristly hairs from base to well beyond middle of postero-dorsal surface, and much stronger bristles on the whole length of antero-ventral surface; hind tibiæ with four to five short bristles on apical half of antero-ventral surface, six to eight longer bristles on entire length of antero-dorsal surface, and six to seven long slender bristles on postero-dorsal surface, the so-called preapical bristle very long, and very slender at apex; tarsi normal. Wings greatly exceeding apex of abdomen, the length of wing equal to that of entire insect; costa with short black setulæ, the costal spine not differentiated; outer cross-vein curved; last section of fourth vein twice as long as preceding section.

Length, 8 mm.

Type locality: Bernard harbour, Dolphin and Union strait, Northwest Territories, June, 1915-16 (F. Johansen).

Alliopsis, sp.

FEMALE.—Similar in colour to *obesa*.

Frons at narrowest part about one-eighth the width of head, the orbits linear and about one-fifth as wide as interfrontalia, bristles as in preceding species; profile as Pl. X, fig. 32, Thorax much less conspicuously haired than in *obesa*, the dorso-centrals stronger and well differentiated; presutural acrostichals irregularly four-rowed, presutural bristle single; prealar as in *obesa*, nearly as long as the bristle behind it; scutellum with a differentiated discal pair of bristles in addition to the marginals. Abdominal hairs very long on lateral margins of segments and on apical two, short on disc, the contrast more striking than in *obesa*; apical genital segment without thorns. Legs less hairy than in *obesa*, the bristles on tibiæ strong and distinct; fore tibiæ with three long bristles, one on the anterior dorsal surface and two on the posterior; mid tibiæ with three antero-dorsal, four to five postero-dorsal, and three postero-ventral bristles; hind femora as in *obesa*, but hind tibiæ with four to five long bristles on the basal half of posterior surface in addition to those on the other surfaces, the latter stronger than in *obesa*. Wings as in *obesa*, but the costal setulæ are longer, the costal spine is distinct, and the outer cross-vein is straight.

Length, 7·5 mm.

Locality: Camden bay, Alaska, June, 1914 (F. Johansen).

It is possible that the two foregoing forms represent only one species.

The genus *Alliopsis* was erected for the reception of the European arctic species *glacialis* Zetterstedt, and is closely allied to *Lasiops* Meigen, both having the eyes very distinctly hairy, but it may be separated from that genus in the male by much more widely separated eyes, those of *Lasiops* being subcontiguous, and by the very broad abdomen. The female of *Lasiops* has the frons similar to that of *Phorbia*, whereas that of *Alliopsis* is not much wider in the male and all the orbital bristles are directed slightly inward, none directed forward.

Egle Robineau-Desvoidy.

This genus contains several species that have been placed in *Anthomyia* by most authors. From the type of the latter *Egle* differs—at least the species known to me—in having the prothorax bare below and in front of the spiracle.

One species is present in this collection.

Egle radicum (Linné).

Musca radicum Linné, Fauna Suec., 2d ed., p. 454, 1756.

Six specimens, with data as follows: Nome, Alaska, August 21, 1916, two specimens, and August 24–25, 1916, three specimens; and Teller, Alaska, July 29, 1913 (F. Johansen).

This is a European species which occurs throughout North America and has previously been recorded from Alaska.

Schnabl and Dziedzicki have erected the genus *Paregle* for the reception of the above species and several others, but I do not think the separation warranted.

Hylemyia Robineau-Desvoidy.

This genus is not well defined, and it is very difficult, in fact almost impossible, to separate some species from the genus *Phorbia* by the application of characters given in published keys to the genera of the family.

The larvæ are very little known; those that are known live either in decaying vegetation or, rarely, in living plants such as wheat.

Hylemyia variata (Fallen.)

Musca variata Fallen. Dipt. Suec., Musc., p. 59, 1820.

There is one female of this species in the collection, taken at Nome, Alaska, August 24 and 25th, 1916 (F. Johansen).

There are records of this European species from many states in North America, its range extending from Massachusetts to Idaho, and south to Louisiana. It has also been recorded from Ontario and Alaska, so that in all probability it is to be found throughout the entire area of North America.

Hylemyia acrostichalis, n. sp.

Male.—Black, shining. Wings clear. Calyptra white. Halteres yellow.

Eyes separated by not more than width of anterior ocellus; frons not buccate; antennæ nearly as long as face, third joint narrow, about twice as long as second; arista with short, rather dense hairs, the longest hairs longer than diameter of arista at base; cheek not much higher than width of facial orbit in profile, and about one-seventh as high as eye, bristles confined to margin, one short bristle above vibrissa; proboscis not very stout. Prealar bristle long and strong; two pairs of long presutural acrostichals present. Abdomen in type crushed; fifth sternite with a deep central excision, the lateral extensions with a fringe of front hairs on inner margin, and a number of bristles on surface, the longest of which does not exceed in length the lateral extension (Pl. X, fig. 39); hypopygium small (Pl. X, fig. 40). Legs slender; fore tibia with one posterior and a weaker antero-dorsal bristle near middle, and a small sharp bristle at apex on posterior side which is directed downward and slightly backward; fore tarsi slender, longer than tibia; mid femur with five to six bristles on basal half of postero-ventral surface; mid tibia with one to two bristles on each of the following surfaces:—antero-dorsal, postero-dorsal, and postero-ventral; mid tarsus normal, not longer than tibia; hind femur with long widely-spaced bristles on antero- and postero-ventral surfaces, those on the latter weaker and not carried to apex; hind tibia with three to four bristles on each of the following surfaces—antero-ventral, antero-dorsal, and postero-dorsal, those on the latter surface much stronger than the others, especially the one nearest apex, posterior surface with one bristle near middle; hind tarsus normal, shorter than tibia. Costa with weak setulæ, the costal thorn distinct but not very long; last section of fourth vein 1·75 times as long as preceding section.

Female.—Similar to male in colour.

Frons nearly one-half the head-width; cruciate bristles long; each orbit with one strong bristle below the forwardly directed supraorbital; cheek narrower than in male. Thorax as in male, the bristles stronger. Genital segments not armed with strong spines. Legs similar in armature to those of male. Costal thorn longer than in male, the upper exceeding the inner cross-vein in length; last section of fourth vein very little longer than preceding section.

Length, 6·5 mm.

Type locality: Nome, Alaska, August 21, 1916 (F. Johansen).

This species bears a resemblance to *marginata* Stein, but differs in armature of fifth abdominal sternite, almost contiguous eyes, and armature of legs. From *simpla* Coquillett, an Alaskan species, it is readily separated by the bristling of the hind tibia.

Phorbia Robineau-Desvoidy.

There are apparently four species of this genus in the collection, none o which are in good condition.

Phorbia brevitarsata, n. sp.

MALE.—Black. Anterior portion of interfrontalia, facial orbits, and the greater portion of cheeks rufous. Wings clear. Calyptra yellow. Halteres yellow.

Eyes separated at narrowest part of frons by a distance more than equal to width across posterior ocelli; cruciate bristles long and hair-like; antennæ short, third joint 1·5 as long as second; arista much swollen at base, tapered to near apex of basal third, almost bare; facial orbit in profile nearly as broad as height of cheek, the latter one-third as high as eye; vibrissal angle weak, almost on a level with lower margin of eye, the portion ventrad of it nearly vertical; cheek with a few weak marginal hairs. Prealar bristle very short; three to four pairs of weak acrostichals in front of suture. Abdomen subcylindrical, but little tapered posteriorly. Legs rather short and stout; mid tibia with one to two bristles on antero-dorsal and postero-dorsal surfaces; hind femur with an almost complete series of widely spaced bristles on antero-ventral surface and a number of similarly disposed bristles on basal half of postero-ventral surface; hind tibia with long slender bristles on antero-ventral, antero-dorsal, and postero-dorsal and postero-ventral surfaces, those on the dorsal surfaces stronger, more irregular, and more widely spaced than those on ventral surfaces, the postero-ventral surface with the bristles very fine and hair-like and in a double series on basal half; hind tarsus distinctly shorter than hind tibia, the basal joint less than one-third the tibial length. Outer cross-vein of wing oblique; last section of fourth vein about 1·5 as long as preceding section.

FEMALE.—Similar to the male in colour.

Interfrontalia not much wider than orbit; cruciate bristles long and strong; two bristles proximad of anterior supraorbital; facial orbit in profile nearly as wide as height of cheek, the latter half as high as eye. Thorax showing traces of pollinose vittæ, a slender one on each side of anterior acrostichals. Abdomen tapered posteriorly; apex of last genital segment with numerous short stout bristles. Fore tibia with one posterior and one antero-dorsal bristle; hind tibia with fewer hair-like bristles on ventral surfaces than male, those on postero-ventral surface confined to basal half. Costal and radial veins noticeably paler than others; costal thorn of moderate length.

Length, 5 mm.

Type locality: West of Konganevik, Camden bay, Alaska, July 4, 1914, and June 1914 (F. Johansen).

The much-protruded face, pale colour of orbits and cheeks, and armature of the hind tibia of male separates this species from any known to me.

Phorbia, sp. 1.

This species closely resembles *substriata* Stein, but differs in having the facial orbits in profile about as wide as height of cheek, the presutural acrostichals more numerous and much weaker. None of the specimens are in good enough condition to ensure accurate identification.

Locality: Bernard harbour, Dolphin and Union strait, Northwest Territories, July 18-19, 1915, and July 1916 (F. Johansen).

Two males and three females.

Phorbia, sp. 2.

Closely resembling the preceding species. Differs in having the frons entirely black, the wings less conspicuously yellow at base, and the costal thorn much shorter.

Locality: Bernard harbour, Dolphin and Union strait, Northwest Territories, August 1-7, 1915, and July, 1916 (F. Johansen).

Phorbia, sp. 3.

One male in very poor condition. Resembles *brevitarsata* in armature of the legs, but differs in having the abdomen depressed, and the hind tarsi about as long as the tibia

Locality: On sandy beach, Bernard harbour, Dolphin and Union strait, Northwest Territories, July 19, 1915 (F. Johansen).

Phorbia, spp.

Five specimens belonging to this genus are in such poor condition that I cannot satisfactorily assign them to any of the preceding species or to any known to me.

Locality: Herschel island, Yukon Territory, July 29, 1916, one female; Bernard harbour, Northwest Territories, July 10, 1915, one male, one female; same locality, June 18, 1915, one female; Collinson point, Alaska, June 20, 1914 (F. Johansen).

Pegomyia Robineau-Desvoidy.

This genus as at present constituted contains species which are very dissimilar in habitus, and my knowledge of the larval habits of a number of the species leads me to consider certain that such species as *unicolor* Stein, *affinis* Stein, and *bicolor* Wiedemann are not congeneric. The first-named I have reared from mushrooms, and the larva resembles much more closely that of *Anthomyia pluvialis* Linné than that of *bicolor*, which is a leaf-miner. The larvæ of *affinis* are found in burrows of rodents and in caves or holes in the ground which mammals or birds frequent and are essentially scavengers; their structure is unknown to me. Both species in the present collection are more closely related to *unicolor* than to *bicolor* and may have the same larval habits.

Pegomyia flavipes (Fallen.)

Anthomyia flavipes Fallen. Dipt. Suec., Musc., p. 90, sp. 125, 1820.
Anthomyia pulchripes Loew. Zeitschr. f. Ges. Naturwiss, 104, 1857.
Pegomyia flavipes (Fallen) Stein. Wien Ent. Zeitg., vol. 25, p. 69, 1906.

This species has the general habitus of *unicolor* Stein, but is considerably darker in colour and is separable from its congeners by the remarkably long bristles on the antero-ventral surface of the hind femora, the longest one being at least three times as long as the diameter of the femora where it is situated. The lower bristle on the postero-dorsal surface of the hind tibia is about half as long as the tibia.

One male specimen in very poor condition, Nome, Alaska, August 21, 1916 (F. Johansen).

Pegomyia albimargo Pandell.

Pegomyia albimargo Pandell, Rev. Ent. France, vol. 20, p. 296, 1901.
Phorbia obscura Meade (nec Macquart). Ent. Month. Mag., vol. 19, p. 216, 1883.

This species is one of the smallest and most variable in colour in the group. Sometimes the whole insect, including the legs, is black, but commonly the abdomen and at least the tibiæ are reddish, or translucent. The thorax is always black and in front is marked with four short vittæ, between which the dorsum is conspicuously white pruinescent. The black antennæ and palpi serve to distinguish the species from *vittigera* Zetterstedt, which it most closely resembles in the chætotaxy of the legs.

Locality: Three male specimens, Nome, Alaska, August 21 and 24 1916 (F. Johansen).

Both these European species are recorded herein for the first time from North America.

FUCELLINÆ.

Fucellia Robineau-Desvoidy.

The species of this genus are found along the margins of streams, on the seashore, and on the shores of lakes

Fucellia punctipennis Becker.

Fucellia punctipennis Becker, Meddel. om Gronland, vol. 29, p. 411, 1908

This species was described from east Greenland and has not since been recorded. All the specimens in the present collection were obtained at Bernard harbour, Dolphin and Union strait, Northwest Territories, May 1916, and June 18, 1915. Eleven specimens (F. Johansen).

Fucellia ariciiformis Holmgren.

Fucellia ariciiformis Holmgren, Kongl. Vetensk. ap. Forhandl., 1872, No. 6, p. 103.

This species was originally described from Greenland. I have seen examples from Pribilof islands. There are twenty-nine specimens in the present collection: nine from Bernard harbour, Dolphin and Union strait, Northwest Territories, taken May 19, 1916, May 20 and 22, June 25, and July 11, 1915; nineteen from Demarcation point, Alaska, May 15, 1914; and one from Collinson point, Alaska, June 20, 1914 (F. Johansen).

SCATOPHAGIDÆ.

The larvæ of most species of this family feed upon decaying vegetable matter and manure. One North American species, *Hydromyza confluens* Loew, mines, in the larval stage, in the stems of *Nymphaea americana*. The imagines of many species are predaceous, feeding upon other small insects, and many of them are found near water, particularly on the shores of rivers, lakes, and the seashore. Many species can be obtained only by very thorough sweeping with an insect net over grasses and other herbage growing in ponds and along their extreme margins.

The literature on this family is in deplorable condition from the point of view of one who has to identify species, and in order to make clear the generic concepts of the writer I have drawn up a key to the genera, which is included in this paper.

Very many species of the family occur in northern latitudes—in fact the family is essentially a northern one—and this key will be found useful in future work on arctic Diptera.

Some of the genera are proposed herein for the first time, and several are recorded for the first time from this continent.

KEY TO GENERA.

1. Species with three sternopleural bristles 2
   Species with two sternopleural bristles 5
   Species with one sternopleural bristle 7
2. First wing-vein bristly on apical half; palpi without long apical britsle; arista short-haired or pubescent; scutellum with two or four bristles; fore femora without closely placed or very strong *antero-ventral* bristles .... *Orthochaeta* Becker.
   First wing-vein bare, or the species does not have all of the above characters 3

KEY TO GENERA—*Con.*

3. Palpi with long apical bristle which is about as long as the palpus; scutellum with six bristles.... *Plethochaeta* Coquillett....

Palpi without long apical bristle; scutellum with two or four bristles 4

4. Arista plumose.... *Pycnoglossa* Coquillett...

Arista alomost bare.... 4a

4a. Fore femora with anterior and antero-ventral surfaces armed with closely placed black bristles.... *Amaurosoma* Becker....

Fore femora without such bristles .... *Psclaphephila* Becker.

5. Third antennal joint with apex rounded; scutellum with two bristles *Hexamitocera* Becker.

Third antennal joint with upper portion of apex acute or angulate; scutellum with four bristles 6

6. Arista much thickened on basal half, the second joint much longer than thick, geniculated with third.... *Gonatherus* Rondani.

Arista thickened at base, second joint about as long as thick, not geniculated apically *Trichopalpus* Rondani, pt. (*Chaetosia* Coquillett)

7 Pteropleura bare.... 8

Pteropleura hairy on at least part of its surface 22

8. Head much longer than high, face much retreating below: palpi with long apical bristle, third antennal joint with a long hair on outer side near base of arista .. *Acicephala* Coquillett.

Head at least as high as long, face not much retreating below; third antennal joint without long hair as above.... 9

9. Orbital bristles very short, distinguishable only with strong lens; cross-vein absent from base of discal cell[1] .... *Hydromyza* Fallen.

Orbital bristles long; discal cell closed at base 10

10. Fore tibiæ with a short, stout, rectangular spine near apex on under side .... *Acanthocnema* Becker.

Fore tibiæ without such rectangularly projecting spine.... 10a

10a. Fore femur and fore tibiæ each with a series of strong bristles on antero- and postero-ventral surfaces.... *Norellia* Robineau-Desvoidy.

Fore femur without strong bristles on antero-ventral surface; bristles on tibia not in two series.... 10b

10b. Third and fourth wing-veins curved downward on their penultimate sections, the first posterior cell proximad of inner cross-vein distinctly broader than at any other point; stigmatal bristle absent; arista pubescent; palpi with long apical bristle; first vein bristly at apex.... *Scoliaphleps* Becker.

Wing venation normal, first posterior cell proximad of inner cross-vein not broader than at any other point.... 10c

10c. First wing-vein bristly on apical half.... 11

First wing-vein bare on apical half.... 16

11. Palpi long and slender, armed at apices with a long bristle; arista plumose.... 12

Palpi not armed at apex with a long bristle, or if so the arista is bare or almost so.. 13

12. Presutrual dorso-central, prothoracic, stigmatal, humeral, and tibial bristles strong; legs stout.... *Cordylura* Fallen, pt..

Presutural dorso-central bristles weak or absent, prothoracic and stigmatal bristles weak; humeral usually absent; tibiæ usually with very weak bristles. *Paralleloma* Becker, pt.

13. Scutellum with six bristles; lower margins of cheeks with numerous long bristles *Bucephalina*, n. gen.

Scutellum with two or four bristles.... 14

14. Male genitalia with very long curled bristles on each side which are directed upward and slightly forward; fore tibiæ with short, black spines on inner side.... *Pogonota* Zetterstedt.

Male genitalia without such bristles; fore tibiæ without short black spines on inner side 15

15. Arista subnude; intra-alar bristles absent .... *Gimnomera* Rondani.

Arista plumose, the hairs widely separated; intra-alar bristles distinct.... *Megophthalma* Becker.

16. Sixth wing-vein not extending to margin.... 17

Sixth wing-vein extending to margin 18

17 Arista plumose; eyes concave on lower posterior margin; legs long and slender *Paralleloma* Becker, pt.

Arista almost bare; eyes rounded; legs short.... *Cordylurella*, n. gen.

18. Prealar bristle more than half as long as the bristle behind it; thoracic and leg bristles long and atrong.... 19

Prealar bristle much less than half as long as the one behond it; thoracic and leg bristles of moderate length.... 20a

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[1] This last character does not apply to the European species

KEY TO GENERA—*Con.*

19. Cheek much less taan half as high as eye; palpi with very long apical bristle *Cordylura* Fallen, pt.
Cheek about half as high as eye; palpi without a long apical bristle 20

20. Mid femur with a long stout bristle at middle on anterior surface. .*Ceratinostoma* Meade.
Mid femur without such bristle ....*Sactophaga* Fallen, pt.

20a. Third antennal joint rounded at apex; arista almost bare; fore tibiæ with short bristles, the inner surface with minute black setulæ ....*Microprosopa* Becker.
Third antennal joint angulate or pointed on upper side at apex 21

21. Area between dorso-centrals cephalad of suture with more than two series of setulæ.. *Spathiophora* Rondani.
Area between dorso-centrals cephalad of suture with only two series of setulæ...... *Trichopalpus* Rondani, pt. (*Opsiomyia* Coquillett)

22. Fore tibiæ with ventral surfaces armed with short stout spines on their entire length; male with a large bifid chitinous plate on each side of apical exposed sternite.... *Allomyia*, n. gen.
Fore tibiæ without short stout ventral spines; apical abdominal sternite not as above. 23

23. Apical half of first wing-vein bristly; sixth vein not extending to margin.......... *Dasypleuron*, n. gen.
Apical half of first wing-vein bare; sixth vein extending to margin................ 24

24. Wings with a number of dark spots, those between third and fourth veins usually enclosing rudimentary veinlets.............................. *Ernoneura* Becker.
Wings clear, sometimes with the cross-veins clouded, but never with small dark spots enclosing veinlets as above..............................*Scatophaga* Fallen, pt.

The genotype of *Bucephalina*, gen. nov., is *Cordylura megacephala* Loew, a species originally described from the District of Columbia, which I have seen from Illinois, and from Plummer's island, Maryland.

Gonatherus Rondani.

I refer one species to this genus. It agrees with the general description of the genotype very well except that the female genital segments are not compressed. Nothing has been known up to this time of the immature stages of this genus.

Gonatherus atricornis, n. sp.

PUPARIUM.—Terra-cotta, almost opaque; apices of posterior spiracles glossy black.

Cephalic and thoracic segments missing. Surface rather closely covered with slight, linear, discontinuous, transverse ridges. No protuberances on base of dorsum of abdomen; each segment with a broad transverse band of very minute locomotor spinules on dorsum and venter; apical segment irregularly rugose on surface, viewed from behind with eight distinct marginal and submarginal protuberances, as follows: a large one slightly below transverse line of spiracles, a smaller one below it on margin and another, still smaller, submarginal one slightly ventrad of the lower one, and a large marginal one laterad of anus; spiracles elevated, their height equal to their apical diameter, separated by about three times the width of their diameter, the openings three in number, the upper and lower ones directed straight dorso-ventrad, the outer directed straight laterad, on inner side of disc there is a rounded depression.

Length, 5 mm.

IMAGO. FEMALE.—Black, densely grey pruinose, only the abdomen and legs slightly shining. Head yellowish testaceous, densely whitish pruinose, upper part of occiput and greater portion of frons fuscous, anterior portion of interfrontalia slightly reddish; antennæ deep black; proboscis glossy black; palpi whitish yellow, fuscous at apices. Dorsum of thorax with two poorly defined, narrow vittæ on anterior half between the acrostichals and dorsocentrals. Legs black; apices of femora below, and all of tibiæ reddish, tarsi fuscous. Wings clear, veins dark brown. Calyptræ white. Halteres brown.

Frons about half the width of head, each orbit nearly half as wide as interfrontalia; lower supraorbital bristle directed forward, the upper two slightly backward; antennæ large, third joint broad, its width over half that of eye, apex not acute, entire length on inner side nearly four times that of second; arista microscopically pubescent, second joint about one-fourth as long as third, the latter swollen on its basal two-fifths; profile as in Pl. X, fig. 34; hairs of lower part of occiput mostly white. Dorsum of thorax with two+three dorso-centrals; acrostichals irregularly two-rowed before suture; discal setulæ sparse and long; scutellum with four long bristles and a number of long setulose discal hairs; sternopleura with two long posterior bristles placed vertically and many long strong hairs; prothoracic and stigmatal bristles strong. Abdomen with numerous long hairs, those on posterior margins strong but not macrochaetæ. Legs normal; fore tibia with two antero-dorsal, two postero-dorsal, and one posterior bristle; mid tibia with one ventral, two antero-dorsal, two postero-dorsal, and one posterior bristles; hind tibia with one large and one to two small antero-ventral, three antero-dorsal, and four to five postero-dorsal bristles. Costa with fine setulæ and more widely spaced spinules; outer cross vein straight, situated at nearly its own length from end of fifth vein, last section of fourth vein nearly twice as long as preceding section.

Length, 5·5 mm.

Type locality: Bernard harbour and cape Krusenstern, Dolphin and Union strait, Northwest Territories, July 3, 1916 (F. Johansen).

I have seen a specimen which I consider belongs to *Gonatherus planiceps* Fallen, the genotype, in another collection from Alaska. From *atricornis* it differs in having the palpi entirely whitish, the legs paler, the wings conspicuously brown along costa and on each side of longitudinal and cross-veins, and in being much less strongly bristled, the acrostichals in front of suture being less numerous and weaker. The two species are very closely related but in my opinion readily separable by the characters indicated herein.

Cordylurella, n. gen.

Generic Characters

FEMALE.—Head, viewed from above, subspherical, slightly flattened posteriorly; frons one-third or more than one-third the head-width; orbits differentiated, the bristles well developed, similar to those of *Cordylura*; antennæ slightly shorter than face, third joint rounded apically, arista pubescent; palpi without strong apical bristle. Thoracic chaetotaxy as in *Cordylura*. First wing-vein bare; sixth not reaching margin of wing. Legs similar to those of *Cordylura*.

Genotype: *Cordylura nebulosa* Coquillett.

There is a male specimen of a species which I refer to this genus in the collection. I can not identify it as any previously described species, and describe it herewith as new.

Cordylurella subvittata, n. sp.

MALE. Black, glossy. Head yellow; occiput, ocellar triangle, and greater portion of frontal orbits glossy black, the orbits and triangle slightly pollinose; face and cheeks with distinct white pruinescence; antennæ yellow; arista black; palpi yellow; proboscis yellow at base, becoming brown at apex. Thorax glossy black, lateral margins, a narrow line along course of dorso-centrals, and a broad central vitta covered with very short grey pile, giving the dorsum a subvittate appearance. Abdomen glossy black; surface with long but not dense yellow hairs, bristles on penultimate dorsal segment black; hypopygial forceps yellow except at base. Legs yellow, mid and hind coxæ brown. Wings clear, veins brown. Halteres brown.

Frons over one-half the width of head, orbits narrowed anteriorly; arista much swollen on basal fifth of third joint, microscopically pubescent; palpi slightly dilated, weakly bristled. Thorax without presutural acrostichals; dorsocentrals weak. Scutellum with two apical bristles. Abdomen somewhat incrassated apically, the hypopygium large, forceps long, curved forward, rather slender. Legs normal, so placed in type that it is not possible to say definitely what the arrangement of the bristles is but they are weak and not numerous, the fore tibia lacking them on posterior surface. Wings extending beyond apex of abdomen, inner cross-vein slightly beyond apex of first vein and almost exactly at middle of discal cell; penultimate section of fourth vein three-fifths as long as ultimate section.

Length, 4 mm.

Type Locality: Bernard harbour, Dolphin and Union strait, Northwest Territories, July 18-19, 1915 (F. Johansen).

This species agrees better with *Cordylurella* than with any other in the appended key to genera though with better material and both sexes available it may be necessary to separate it generically from *nebulosa*. The latter is readily distinguished from *subvittata* by its densely pruinose thorax, more strongly spined legs, the antero-dorsal bristles on the *femora* being noticeably stronger and more numerous, and the presence of a strong posterior bristle on the fore tibia. The scutellum in *nebulosa* has four bristles.

Dasypleuron, n. gen.

Generic Characters.

Head in type-species so badly crushed that it is not possible to give full description; in general it appears to resemble that of *Cordylurella* but the antennæ are not visible owing to the face being crushed in, the apical portion of one arista, which is distinctly pubescent, alone being visible. The thorax has the same chætotaxy as *Cordylura latifrons* Loew., but the pteropleura has a number of long soft hairs on the middle. Abdomen short and stout, hypopygium occupying over half of the ventral surface, the forceps chitinized and stout, similar to, but larger than, those of *Cordylurella subvittata*. Legs normal. First wing-vein bristly on apical portion; sixth vein incomplete.

Genotype: *Dasypleuron tibialis*, n. sp.

Dasypleuron tibialis, n. sp

MALE.—Glossy black. Head black; frons brownish red, orbits and triangle black, slightly grey pruinose; palpi black; proboscis glossy black. Thorax slightly pruinose on dorsum, not vittate. Abdomen entirely glossy. Legs black; apices of fore femora, and all tibiæ reddish yellow, the mid and hind pair darker apically. Wings clear, veins black. Halteres black. Bristles black, hairs fuscous, those on ventral surfaces of femora pale.

Orbital bristles long and slender; palpi spindle-shaped, with rather weak bristles; proboscis normal. Dorsum of thorax with numerous long setulose hairs on front margin laterally and laterad of presutural dorso-centrals, presutural acrostichals strong; anterior postsutural dorso-central duplicated in type so that there appears to be two strong and two weak post-suturals, scutellum with four subequal bristles; hairs on pleurae long; prothoracic and stigmatal bristles long and slender; almost entire surface of mesopleura hairy. Abdomen with rather long hairs, basal hypopygial segment with a number of strong bristles; apical visible ventral segment armed with long hairs. Legs normal; femora with long hairs on the ventral and anterior surfaces, those on anterior surface of mid pair and antero-ventral surface of hind pair bristle-like; fore and hind tibiæ apparently without bristles, mid pair with one bristle on dorsal surface near apex. Inner cross-vein distinctly beyond apex of first vein and at three-sevenths from apex of discal cell; penultimate section of fourth vein about half as long as ultimate section.

Length, 4·5 mm.

Type Locality: Collinson point, Alaska, June 20, 1914 (F. Johansen).

Allomyia, n. gen.

I described this genus in a paper, which was completed some time ago, on Pribilof Island Diptera, but it will not go to press until after this paper. I had in that collection the female only. The generic synopsis in this paper and the following description may be accepted as embodying characters of the genus, though it is possible that the furcate processes of the fifth abdominal sternite are not present in the male of the other species.

Allomyia unguiculata, n. sp.

MALE.—Black, thorax and abdomen greyish pruinose. Head brownish, black, anterior portion of frons, lower half of face, and anterior part of cheeks yellowish; antennæ black; palpi yellow; proboscis black. Legs black, tibiæ brownish, yellow at bases, tarsi brown. Wings clear.

Orbital bristles rather weak; antennæ large, third joint about twice as long as second, subangulate at apex on upper side (Pl. X, fig. 37); arista bare, tapered on basal third of apical joint; cheek about one- fourth the eye-height. Dorsum of thorax with five well-developed dorso-centrals; scutellum with short discal hairs and four strong marginal bristles; pteropleura with hairs on centre; sternopleura with long hairs and one strong bristle. Abdomen subcylindrical, narrow, fifth sternite with a large bifid plate on each side (Pl. X, fig. 38), hypopygium small (Pl. X, fig. 36). Legs as in *Dasypleuron*, but the fore tibiæ with short ventral spines; tibiæ with the bristles as follows—fore tibia with one antero-dorsal and one to two posterior, mid tibia with one antero-dorsal, one postero-dorsal, and one posterior, hind tibia with two antero-ventral near apex, two antero-dorsal, and one postero-dorsal. Inner cross-vein well beyond apex of first and at less than two-fifths from apex of discal cell.

Length, 3·5 mm.

Type locality: Chantry island, Bernard harbour, Dolphin and Union strait, Northwest Territories, June 17, 1916 (F. Johansen).

This specimen was in very poor condition, and in order to get the structures into condition for examination I had to boil it. Originally pinned, it is now preserved in alcohol, in a fragmentary condition.

The foregoing species differs from the genotype in the colour of head and legs, in having the palpi narrower, and the wings longer and with thinner veins.

Ernoneura Becker.

This genus has only once previously been recorded from the western hemisphere. There is only one species of the genus, which was originally described by Zetterstedt from the European arctics.

Ernoneura argus Zetterstedt.

Represented by five specimens taken at Bernard harbour, Dolphin and Union strait, Northwest Territories, three specimens, July 19, 1915, and two specimens, July, 1916.

Becker states that there is no sternopleural bristle present, but it is well developed in the specimens before me.

Scatophaga Fallen.

The members of this genus are much more common in temperate latitudes than in subtropical or tropical, and are, judging from collections I have examined, particularly abundant both in individuals and species in the extreme northern portions of the western hemisphere. In the present collection there are three species represented by thirty-seven specimens.

The larvæ feed upon decaying vegetable matter and in manure; the flies are predaceous, but also feed on the same substances as the larvæ.

In order to make it possible for students of the order to recognize the species before me, I give a key for their identification, using characters similar to those used in a key to part of the same genus in a paper written for the U. S. Bureau of Biological Survey on Pribilof Island Diptera, which at time time of writing is ready to go to press.

KEY TO SPECIES.

1. Mid and hind tibiæ with a number of strong outstanding bristles in addition to the long, soft hairs 2
   Mid and hind tibiæ without strong bristles, with only soft hairs (Group unrepresented)
2. Cross-veins of wings not infuscated; legs almost entirely black (Unrepresented)
   Cross-veins of wings very noticeably infuscated; legs almost entirely, or entirely, yellowish or reddish. 3
3. Arista long haired at base; antennæ entirely reddish yellow; apical ventral abdominal segment of male as in Pl. X, fig. 35; pteropleura bare . *suilla* Fabricius.
   Arista bare. 4
4. Hind femur with several long bristles on antero-dorsal surface of apical half; pteropleura and hypopleura bare. . . . . *furcata* Say.
   Hind femur without such bristles; pteropleura sometimes with a few long hairs on centre; upper portion of hypopleura with a few long hairs. . . . . . *rubicunda* Malloch

Scatophaga suilla (Fabricius).

Musca suilla Fabricius. Ent. Syst., vol. 4, p. 343, 1794.

One male and one female, Nome, Alaska, August 21, 1916 (F. Johansen). A European species previously reported from Alaska.

I have figured the fifth sternite of *suilla* and *lutaria* Fallen to illustrate the specific distinction (Pl. X, fig. 5, 35 and 35*a*). *Lutaria* occurs in Alaska, Ohio, and New Hampshire.

Scatophaga furcata (Say).

Pyropa furcata Say. Jour. Acad. Nat. Sci. Phila., vol. 3, p. 98, 1823.

Thirty-two specimens from the following localities: Nome, Alaska, August 21 25, 1916, eight specimens (F. Johansen); Barter island, Alaska, July 2, 1914, twelve specimens, June 8, 1914, twelve specimens (D. Jenness); Collinson point, Alaska, June 15, 1914, twelve specimens (F. Johansen); point Pullen, Wollaston peninsula, Victoria island, August 18, 1915, one specimen (D. Jenness).

This very common species occurs throughout North America well into the arctics, and is equally common in Europe.

Scatophaga rubicunda Malloch.

Scatophaga rubicunda Malloch, in press

This species is represented in the collection by three specimens, one male from Cockburn point, Dolphin and Union strait, Northwest Territories, Canadian Arctic coast, September 7, 1914, and one male and one female from Bernard harbour, Dolphin and Union strait, Northwest Territories, June 17, 1915, and June 20, 1916 (F. Johansen).

I have previously seen it from Pribilof islands, Bering sea.

HELOMYZIDÆ.

The larvæ of this family live in carrion and manure. Some of the species are found in caves and in underground nests of rodents.

The family is represented in this collection by imagines only. In order to facilitate the indentification of the genera in this paper a generic synopsis is given herewith.

KEY TO GENERA.

1. Humeral bristle present 2

Humeral bristle absent 3

2. Thorax with five dorso-centrals .... *Helomyza* Loew.

Thorax with two dorso-centrals .... *Achaetomus* Coquillett.

3. Thorax with one pair of dorso-centrals .... *Porsenus* Darlington.

Thorax with at least two pairs of dorso-centrals 4

4. Mid tibiæ with long bristles on middle .... *Oecothea* Haliday.

Mid tibiæ without bristles except at apex 5

5. Thorax with five or more pairs of dorso-centrals 6

Thorax with two pairs of dorso-centrals .... *Neoleria*, gen. n.

Thorax with three pairs of dorso-centrals .... *Tephrochlamys* Loew

Thorax with four pairs of dorso-centrals 8

6. Scutellum with six bristles; inner cross-vein much before end of first vein; mesopleura bare .... *Anorostomoides* Malloch.

Scutellum with four bristles 7

7. Inner cross-vein distinctly before end of first vein; frons in male very narrow; propleural and mesopleural bristles present .... *Heteromyza* Fallen

Inner cross-vein at or beyond end of first vein; propleural and mesopleural bristles absent; eyes of male widely separated .... *Allophyla* Loew.

8. Eyes very small, not much larger than antennæ; arista remarkably long; vibrissæ strong .... *Eccoptomera* Loew.

Eyes much larger than antennæ; arista short; vibrissæ short and weak; face receding, oral margin not developed .... *Anorostoma* Loew.

Eyes large; arista long; vibrissæ strong; mouth margin well developed .... *Leria* Loew.

Oecothea Haliday.

There is a large series of a species of this genus in the collection. I cannot identify it with any of the previously described European species and it differs essentially from *fenestralis* Fallen—a species occurring in Europe and North America.

Oecothea aristata, n. sp.

MALE AND FEMALE.—Head, anterior lateral angles of thorax, greater portion of scutellum, hypopygium of male, genital segments of female, and the legs reddish testaceous; upper portion of head and greater portion of occiput, thorax abdomen, coxæ, sometimes median portion of femora, and whole of tarsi fuscous. Wings yellowish, cross-veins not infuscated.

Frons about two-thirds the width of head, orbits with one bristle near middle; interfrontalia with sparse, short hairs; antennæ small, third joint barely longer than second; arista very slender, nearly bare, about 2·5 as long as head, with a very short swelling at base; face with a broad central carina which is flattened and broadened below, covering the entire centre of face, cheeks with one strong vibrissa and a number of short setulæ; eye about equal in height to cheek at posterior margin. Three pairs of postsuturals present; propleura with one bristle; a few short setulæ below anterior spiracle; mesopleura with or without a short bristle; sternopleura with one long bristle and a number of short setulæ; pteropleura bare; hypopleura with a number of minute setulæ below spiracle, scutellum bare on disc, margin with four bristles. Abdomen of male subcylindrical, fifth sternite with short, stubby setulæ on apical half; hypopygium large, knob-like; abdomen of female more flattened, genital segments small. All femora of male slightly thickened, their antero- and postero-ventral surfaces each with a series of short black bristles; femora of female not so stout and with much weaker and more widely spaced bristles; mid tibiæ in both sexes with one to four strong antero-dorsal bristles and three to five irregularly placed unequal-sized posterior bristles; hind tibia of male slightly curved, with a very pronounced apical callosity on ventral surface, the entire ventral surface with dense, short, erect hairs; hind tibia of female without a pronounced apical callosity and with much less distinct ventral hairs. Costal spines long and widely spaced; last section of fourth vein about 1·5 as long as preceding section.

Length, 5-7 mm.

Type locality: Bernard harbour, Dolphin and Union strait, Northwest Territories, July 10, 1916 (F. Johansen). Paratypes, same locality as type, August 1-7 and 14, 1915, and September, 1915 (F. Johansen). Thirty-five specimens.

Differs from *fenestralis* Fallen, in being much larger and, in the male, in having the hind tibiæ with a very decided apical production or callosity, and in both sexes in having the cross-veins not infuscated.

Leria Robineau-Desvoidy.

Represented by one species in the collection.

Leria fraterna (Loew).

Scoliocentra fraterna Loew. Berl. Ent. Zeitschr., 1863, p. 27.

A male specimen, with data as follows: Nome, Alaska, August 24, 26, 1916 (F. Johansen).

This species has previously been recorded from Alaska, and is generally distributed in the United States and Canada.

Neoleria, n. gen.

Generic Characters.

Similar to Leria, differing in having only two pairs of well-developed, postsutural, dorso-central, thoracic bristles.

Genotype: *Neoleria rotundicornis*, n. sp.

Neoleria rotundicornis, n. sp.

MALE.—Reddish testaceous, subopaque, upper portion of frons, occiput, dorsum of thorax except humeri and scutellum, greater portion of pleuræ, and abdomen except the hypopygium, fuscous, with grey pruinescence. Wings faintly yellowish, veins pale brown.

Frons less than one-half the head-width, orbits differentiated, each with two strong bristles and a few short setulæ, interfrontalia with short setulæ; antennæ large, third joint almost orbicular, second very small; arista about as long as length of frons, with a short swelling at base, apical part not as slender as in *Oecothea*, with microscopic pubescence; eyes almost round, of moderate size; face almost perpendicular; cheek about half as high as eye, with a few short marginal bristles and one long vibrissa; proboscis stout; palpi normal. Dorsum of thorax with numerous moderately long setulose hairs and two pairs of postsutural, dorso-central bristles; scutellum short and broad, rounded in outline and subconvex on disc, bare except for the four marginal bristles; propleural bristle strong; mesopleura bare except for a few setulæ on anterior lower angle; sternopleura with one strong bristle and a few setulose hairs; pteropleura and hypopleura bare. Abdomen with short setulæ and a few longer bristles on posterior margins of segments; hypopygium of moderate size, subglobose. Legs with a few bristles but with numerous short setulose hairs; fore femora with long bristles on postero-dorsal and postero-ventral surfaces; mid femur with at least one moderately strong bristle on anterior surface at middle; mid and hind tibiæ with preapical dorsal bristle, fore pair not visible. Inner cross-vein before extreme apex of first vein and slightly beyond middle of discal cell; outer cross-vein straight, at more than half its own length from end of fifth; last section of fourth nearly 1·5 as long as preceding section; costal spines very little longer than diameter of costal vein.

Length, 4 mm.

Type locality: Nome, Alaska, August 24 and 25, 1916 (F. Johansen).

PIOPHILIDÆ.

The larvæ of all species of this family known to me feed in carrion, or on preserved meats, cheese, etc. I have found some species in numbers on dead animals, especially on the seashore and on the banks of rivers. There is only one specimen in the present collection, which is herein described as new.

Piophila borealis, n. sp.

MALE.—Glossy black.

Head black, interfrontalia, lower part of orbits, face, cheeks, and palpi reddish yellow. Thorax black, humeri, lateral portions of scutellum, and posterior lateral angles of mesonotum translucent red; propleura grey pruinose. Abdomen black. Legs black, trochanters, extreme apices of femora, bases (broadly) and apices (narrowly) of all tibiæ, basal four joints of mid, and three joints of hind, tarsi reddish yellow. Wings clear, veins yellow. Halteres yellow.

Frons plain, with weak setulæ proximad of triangle; anterior orbital bristle very small; central postvertical pair of bristles twice as long and strong as laterals; vibrissa strong; cheek almost as high as eye. Thorax smooth, rather densely covered with short dark hairs; scutellum subtriangular, convex in centre of disc; apical bristles distinctly longer than laterals; propleural bristles of moderate length. Abdomen broad, the surface granulose and armed with rather closely placed short setulose hairs; hypopygium small. Legs normal both in strength and armature. Inner cross-vein slightly beyond apex of first; sections of fourth vein 6: 5 : 7 from base to apex.

Length, 3 mm.

Type locality: West of Konganevik, Camden bay, Alaska, July 4, 1914 (F. Johansen).

This species differs in the colour of the humeri and scutellum from any described in the recent paper on the family by Melander and Spuler[1].

EPHYDRIDÆ.

The members of this family are found in the vicinity of water, the larvæ being almost without exception aquatic.

There is only one species in this collection.

Scatella brunnipennis Malloch.

I described this species in the paper on Pribilof Island Diptera previously referred to, but which has not yet appeared in print.

Localities: Demarcation point, Alaska, and Collinson point, Alaska, May 16, and June 20, 1914; Collinson point, Alaska, September, 22, 1913, Bernard harbour, Northwest Territories, July, 1915 (F. Johansen).

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[1] Bull. 143 Wash. Agr. Exper. Station, 1917.

CHLOROPIDÆ.

There is only one species of this family in the collection. The larvæ of this species feed in stems of wheat and grasses.

Botanobia (Oscinis) frit (Linné).

Musca frit Linn. Fauna Suecia, 1761, p. 1851.

One specimen in very poor condition.

This European species occurs throughout the United States and Canada, extending into Alaska.

Locality: West of Konganevik, Camden bay, Alaska, July 4, 1914 (F. Johansen).

EXPLANATION OF PLATE VII.

Fig. 1. *Simulium*, sp. 4, maxilla of larva.
" 2. Same, labium of larva.
" 3. Same, mandible of larva.
" 4. *Simulium*, sp. 2, thoracic respiratory organ of pupa.
" 5. *Psilotanypus*, sp.? caudal fin of pupa.
" 6. *Rhamphomyia erinaceoides*, apex of abdomen of male, lateral view
" 7. *Simulium*, sp. 4, antenna of larva.
" 8. *Dolichopus dasyops*, antenna of male.
" 9. Same, hypopygial lamella of male.
" 10. *Psilotanypus*, sp.? thoracic respiratory organ of pupa, front view
" 11. Same, lateral view
" 12. *Simulium*, sp. 4, thoracic respiratory organ of pupa.
" 13. *Simulium*, sp. 3, same as above.

EXPLANATION OF PLATE VIII

Fig. 14. *Oedamagena tarandi*, anal spiracles of larva, one outlined only
" 15. *Euphorocera gelida*, spiracles of puparium.
" 16. *Cephenomyia* sp.? cephalopharyngeal skeleton of larva, dorsal view of one-half.
" 17. *Oedamagena tarandi*, larva, dorsal view.
" 18. *Cephenomyia* sp.? caudal end of larva.
" 19. *Phormia cærulea*, lateral view of head of male.
" 20. *Leptocera transversalis*, wing.
" 21. *Peleteria arctica*, head of female, lateral view

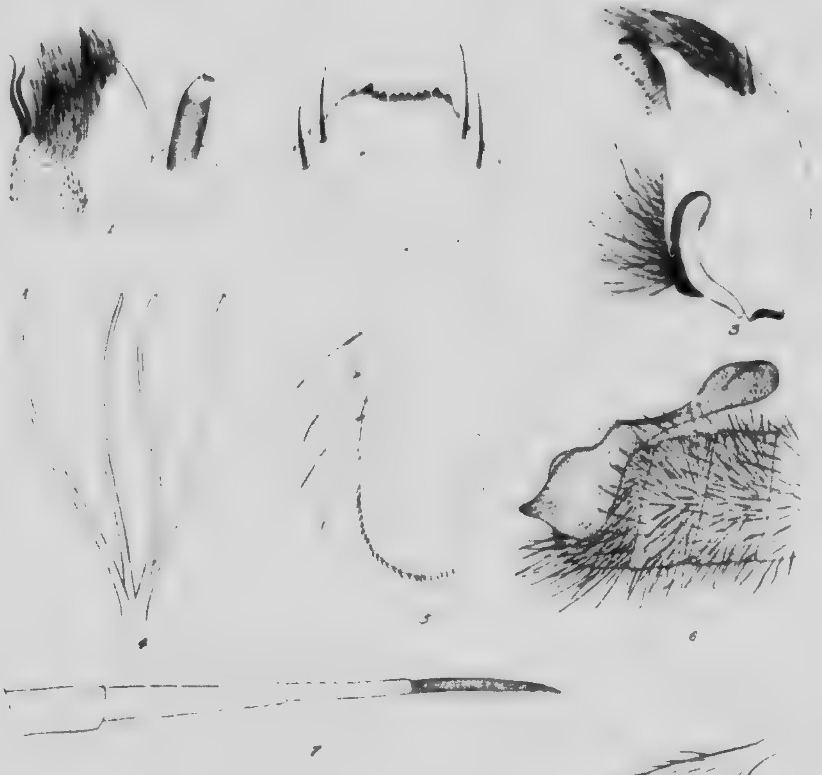
EXPLANATION OF PLATE IX.

Fig 22. *Mydæina obscura*, puparium, lateral view.
" 23. Same, anal spiracles.
" 24. Same, cephalopharyngeal skeleton of larva, lateral view
" 25. Same, apical segment of larva, dorsal view.
" 26. Same, antepenultimate segment of larva, lateral view.
" 27. *Aricia borealis*, posterior tibia of male, lateral view.
" 28. *Mydæina obscura*, head of male, lateral view.
" 29. Same, fifth sternite of male, ventral view.
" 30. *Pogonomyioides atrata*, posterior portion of cephalopharyngeal skeleton of larva, lateral view.
" 31. *Mydæina obscura*, apex of male adbomen, lateral view.

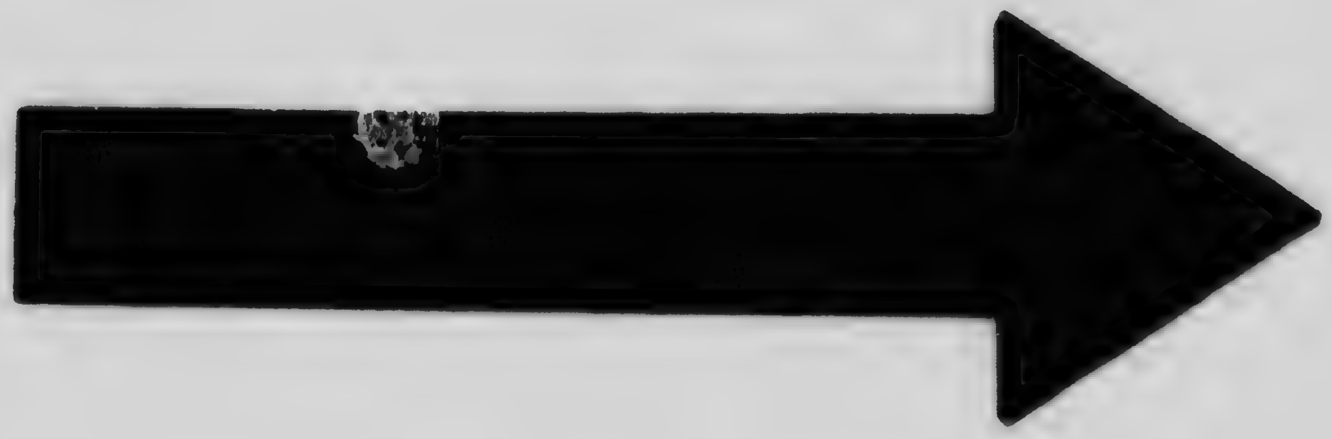
EXPLANATION FOR PLATE X

Fig. 32. *Alliopsis*, sp.? head of female, lateral view.
" 33. *Alliopsis obesa*, head of male, lateral view.
" 34. *Gonatherus atricornis*, head of female, lateral view.
" 35. *Scatophaga suilla*, fifth sternite of male, ventral view.
" 35a. *Scatophaga lutaria*, same as above.
" 36. *Allomyia unguiculata*, apical segments of abdomen of male, ventral view.
" 37. Same, antenna, leteral view.
" 38. Same, apical segments of abdomen of male, lateral view.
" 39. *Hylemyia acrostichalis*, fifth abdominal sternite of male, ventral view.
" 40. Same, hypopygium of male, one side, caudal view.

PLATE VII.



Diptera collected by the Canadian Arctic Expedition, 1913-16.
(Excluding the Tipulidæ and Culicidæ).



MICROCOPY RESOLUTION TEST CHART

(ANSI and ISO TEST CHART No. 2)

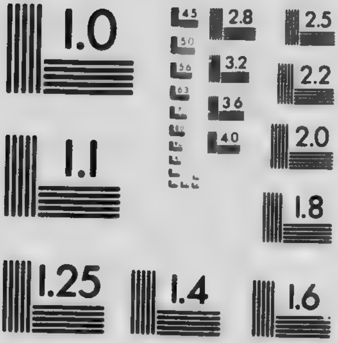


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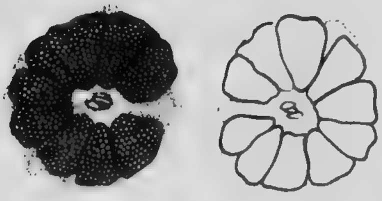
PLATE VIII.



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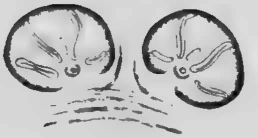

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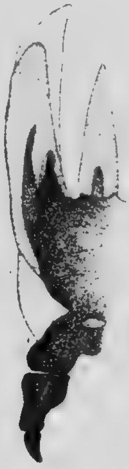

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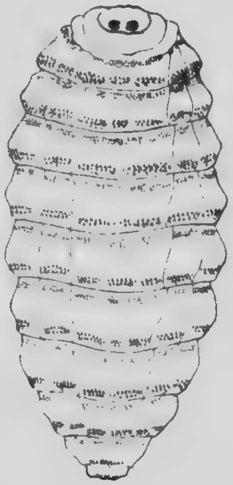

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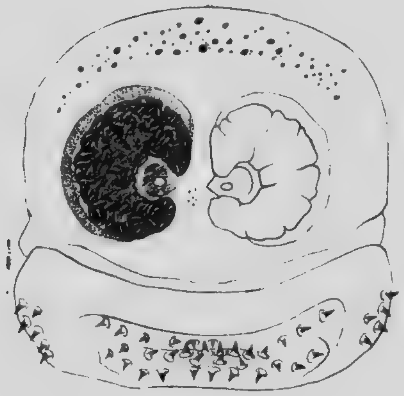

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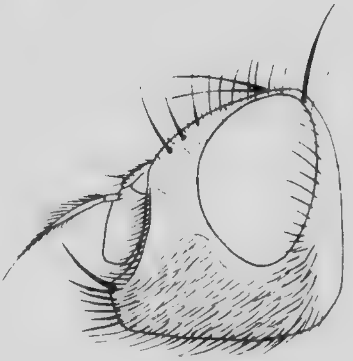

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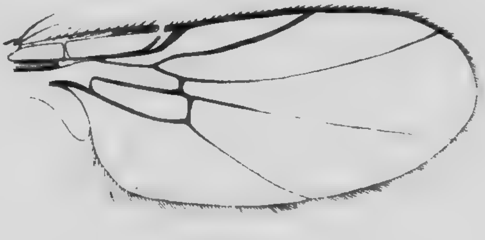

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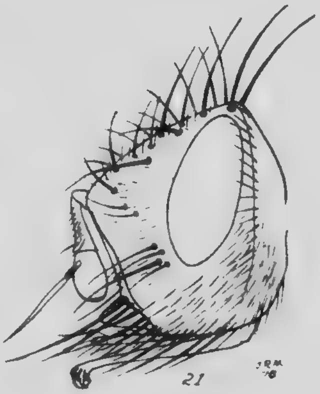

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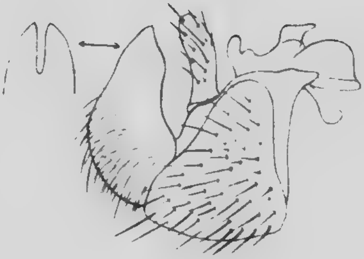
Diptera collected by the Canadian Arctic Expedition, 1913–16.
(Excluding the Tipulidæ and Culicidæ).

PLATE IX.



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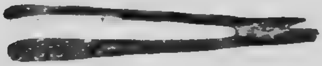

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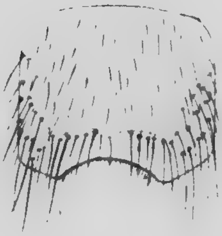

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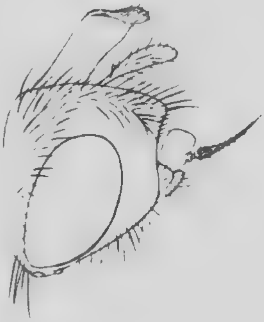

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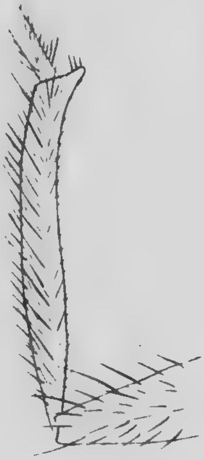

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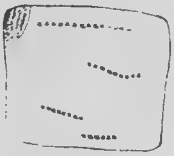

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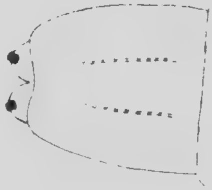

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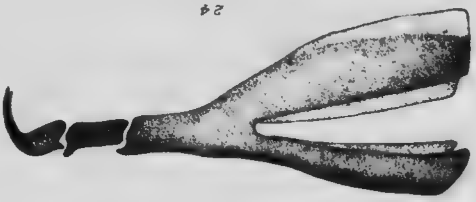

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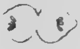

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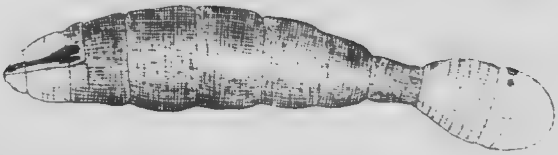

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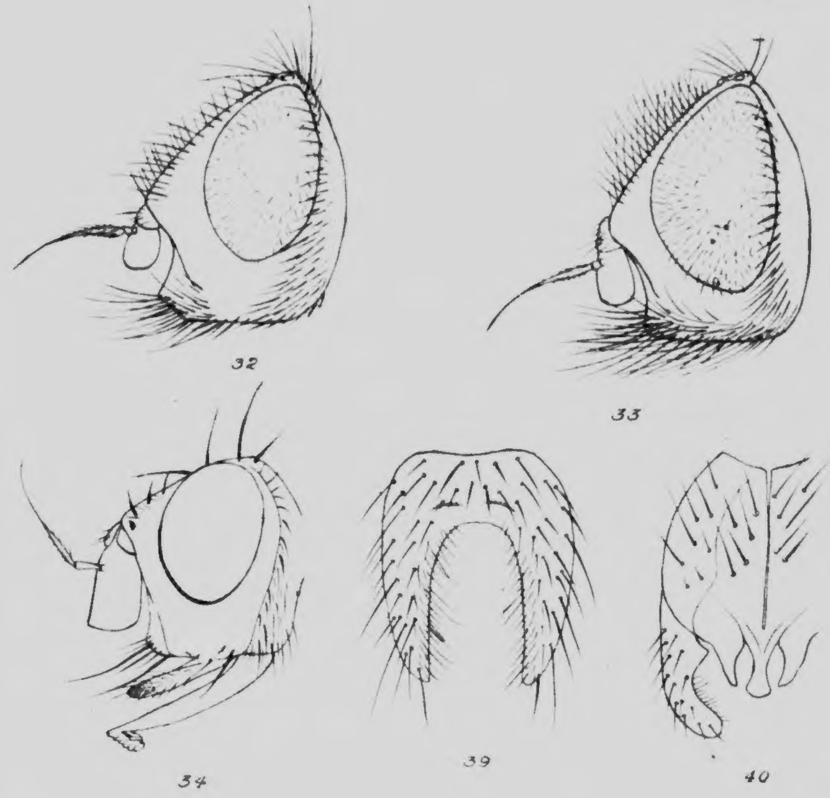
Diptera collected by the Canadian Arctic Expedition, 1913–16.
(Excluding the Tipulidæ and Culicidæ)

PLATE X.



Diptera collected by the Canadian Arctic Expedition, 1913–16.
(Excluding the Tipulidæ and Culicidæ).